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THE LOCATION OF GERMAN IMMIGRANTS IN THE MIDDLE WEST*

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THE movement of Europeans to North America during the nineteenth century represents the greatest migration of all times. Next to the English the Germans contributed more than any other nationality to this migration¹ (Table I). Still, it is difficult to ascertain the numerical size of the German immi-

TABLE I†

Year	Leading Nationality Groups in the United States 1850-1900 Percentage of total foreign born					
	Germany		Ireland		Great Britain	
	Number	% of foreign born	Number	% of foreign born	Number	% of foreign born
1850	583,774	26.0	961,719	42.8	278,675	12.4
1860	1,276,075	30.8	1,611,304	38.9	433,494	10.5
1870	1,690,533	30.4	1,855,827	33.3	555,046	10.0
1880	1,966,742	29.4	1,854,571	27.8	664,160	9.9
1890	2,784,894	30.1	1,871,509	20.2	909,092	9.8
1900	2,666,990	25.8	1,618,567	15.6	842,078	8.1

† From *Twelfth Census of the United States, 1900*, I, p. clxxi.

gration to the United States, chiefly for two reasons. First, people of German tongue and culture came to North America not only from Germany, but also from Holland, Belgium, France, Switzerland, Austria, Poland, Russia, and the Baltic countries. These immigrants do not appear as "born in Germany" in any statistical table. Yet after having maintained cultural and linguistic characteristics as minority-groups in non-German countries of Europe they often proved less assimilable in the United States than immigrants from Germany. The best known example is that

*The author is indebted to the Social Science Research Council for a grant-in-aid in 1945 to study German immigration to the Middle West. The project was sponsored by the late Ralph Brown to whose memory this paper is dedicated.

¹ *Eleventh Census of the United States, 1890*, I, p. cxxxv.

of the Russians in the Dakotas, Nebraska, and Kansas who call themselves *Russ-laenders* and have preserved socio-religious customs, agricultural practices, and, at least partly, a German-language press of their own. Another illustration are the persons who were "born in France" according to the federal manuscript census of 1860 to 1870 and who can be identified as recent immigrants through the ages of children, still born in France. Many of these French have German names; they went to German communities in this country, were of German background, and often intermarried with immigrants from southwestern Germany. They came from Alsace-Lorraine. Secondly, statistics kept by port authorities since 1820 as to the number of immigrants who landed, have to be used with discretion.² It is impossible to ascertain how many entered a second or third time, how many passed through in order to proceed to Canada, how many returned to Europe later on, and how many entered from Canada or Mexico.³

The next official record of an immigrant was his enumeration in the first federal census subsequent to his arrival. A "German" often answered the question about his country of birth in such a way as to make his origin hard to recognize. He might name a native village, a small dukedom—frequently misspelled by the harassed census taker—or reply ambiguously by answering for instance, "Holland, Germany," or "Germany unknown," or "Edinburg, Germany," "Alconda, Germany".⁴ Those who are familiar with original census records appreciate the impossibility of obtaining a completely accurate numerical evaluation of different nationalities in the United States in the nineteenth century. The general statement must suffice that Germans contributed a little more than five million immigrants between 1820 and 1900.⁵

Problems connected with this migration have been investigated by historians and sociologists to a greater degree than by geographers.⁶ German-American lay-writers had a great deal to say about the part played by their countrymen in the new world, but all too frequently from a sentimental or biased point of view. Their vast output yields valuable information for details, but facts and fancy have to be sifted diligently. Among the most informative studies of recent date are the investigations by Joseph Schafer, Walter F. Kollmorgen, and Arthur Cozzens—all

² Customs collectors at every port reported to the Secretary of State the number of foreign born passengers who disembarked after September 30, 1820. Not until 1868 was a distinction made between immigrants and tourist passengers.

³ A discussion of the percentages to be deducted from listed entries in order to obtain the number of actual settlers is found in *Eighth Census, 1860*, Washington 1864, pp. xxi-xxii.

⁴ The technique of counting "Germans" from manuscript census volumes is discussed in Hildegard Binder Johnson, "The Distribution of the German Pioneer Population in Minnesota," *Rural Sociology*, VI, March 1941, 17-22.

⁵ J. Hanno Deiler in a thorough compilation for the Germanistic Society of Chicago arrived at 6,893,489 entries from Great Britain between 1820 and 1900, and 5,010,247 from Germany for the same period. See also, J. Hanno Deiler, *Die Europäische Einwanderung nach den Vereinigten Staaten von 1820 bis 1896*. New Orleans, 1897.

⁶ Source materials available for research in immigration is discussed by Marcus Hansen, "The History of American Immigration as a Field for Research," *American Historical Review*, XXXII, April 1927, 500-518.

for small regions and based on original data and observations.⁷ More are desirable for an understanding of the interaction between old-world emigrants and their new environment. This paper hopes to contribute an answer to the basic question, "How did the German immigrants distribute themselves in the Middle West?"

Available maps are not very satisfactory. Nationality data for counties were published for the first time in 1870. Maps in the published census of 1870 are of small scale and show the density per square mile of different foreign groups in four shadings. We recognize that the Germans spread mostly over the North Atlantic and North Central States and concentrated in and around cities. Other foreign born groups, the English and Welsh, the Irish, the Swedish and Norwegian, had not spread as widely as the Germans over the whole settled area of the United States by 1870. We can associate the distribution of German immigrants loosely with the southern shores of the Lakes and with the Ohio, Mississippi, and Missouri rivers. In this respect they were not distinctive from the population as a whole.⁸ *The Statistical Atlas of the United States* for 1900, published in 1903, contains two small maps showing the density of German born per square mile by counties, ranging from a half to two persons to twenty persons and over, and the proportions of natives of Germany to the total population. A new approach is found in the *Atlas of the Historical Geography in the United States* where the distribution of German born in 1880, 1900, and 1930 is shown in four shadings indicating the number of Germans per county, from one to ten, ten to one hundred, one hundred to one thousand, and over one thousand. The correlation of absolute numbers to the greatly varying size of the counties results in area bias: St. Louis County, the largest in Minnesota, and prairie counties in Nebraska are as black as New York.⁹ Two dot symbols of different sizes for one thousand and ten thousand persons were used in the *Atlas of American Agriculture* to show the distribution of German stock, not German born. This achieves a true picture of concentration in the northeast of the United States and of centers in Wisconsin, southern Minnesota, Iowa, and eastern Nebraska.¹⁰

A more ambitious set of maps was produced in Germany in 1936 due to the

⁷ Joseph Schafer. *Four Wisconsin Counties, Prairie and Forest. The Wisconsin Lead Region. The Winnebago-Horicon Basin.* Wisconsin Domesday Book. General Studies, II, III, IV, Madison 1927, 1932, 1937. Walter Kollmorgen, *The German-Swiss in Franklin County, Tennessee.* United States Department of Agriculture, Bureau of Agricultural Economics, Washington, June 1940. "Agricultural Stability of the Old Order Amish and Old Order Mennonites of Lancaster County, Pa." *American Journal of Sociology*, XLIX, November 1943, 233-41. Arthur B. Cozzens, "Conservation in German Settlements of the Missouri Ozarks," *Geographical Review*, XXXIII, No. 2 (April 1943), 286-298.

⁸ *Ninth Census, 1870*, Washington, 1872, I, maps after pp. 327 and 343.

⁹ Charles O. Paullin, ed. John Wright, *Atlas of the Historical Geography of the United States*, Carnegie Institution of Washington and American Geographical Society of New York, 1932.

¹⁰ *The Atlas of American Agriculture*, Rural Population Section, Washington 1912. Reprinted in O. E. Baker, "Agricultural Regions of North America," *Economic Geography*, III (1927), 329.

strong political interests in Germans abroad during the thirties.¹¹ Hannemann's maps show the distribution of German born in the United States for every census year from 1860 to 1930 by dots representing one hundred Germans each. Since one dot can stand for any number between fifty-one and one hundred and fifty, forty-seven German born persons in Wayne County, Nebraska, in 1870, for instance, cannot be shown. Large cities were taken out and represented by circles along the margin. The advance over maps published in this country lies in the possibility of following the development of German distribution over seventy years. But little new information could be gained from the absolute method. The necessity of using solid circles in lieu of many dots for rural counties with heavy German populations results in the impression of clusters of towns where in reality rural settlement prevailed. A comparative map was published in the *Archiv für Landes- und Volkskunde* during World War II. It shows the percentage of German born and their children in the total population for each county in the twelve North Central States and in Texas and Oklahoma in 1910.¹²

Thus there are no comparative maps for the second half of the nineteenth century, that is, for the period when the number of the German born in this country was highest. During that period the demographic pattern which is still recognizable and of consequence to cultural and economic life, particularly in the Middle West was set. The north Central Division, under which the states of Ohio, Indiana, Illinois, Michigan, Wisconsin, Minnesota, Iowa, Missouri, Nebraska, Kansas, and North and South Dakota are listed in the census, represents the great continuous area of German settlement during the last century. In 1900, 1,461,603 of 2,666,990 German-born—the highest number ever counted in the United States—lived inside a crescent outlined by the Missouri river valley and the Mississippi to the mouth of the Ohio, the Ohio valley, the southern shores of the Lakes, central Wisconsin back to the Mississippi, and the Minnesota valley. Migration by small German groups into Ohio and Indiana began soon after 1800, into Missouri in the twenties, into southern Illinois in the early thirties, into Iowa and Michigan in the early forties, and into Minnesota, Nebraska, and Kansas in the latter part of the fifties. These early settlements were small and spotty in distribution and were close to rivers, the main arteries of transportation, like all settlements. An evaluation of possible peculiarities in the distribution of these German settlements must be based on a comparative representation.

Every population map of the United States shows the states at different stages of settlement. A general map of 1860 would show the regions of initial German settlements in central Wisconsin, Michigan, Minnesota, and eastern Iowa. But the federal census does not contain data of different nationalities in different counties for that year. Also, 1860 is too early for central Iowa, Nebraska, and Kansas

¹¹ Max Hannemann, "Das Deutschtum in den Vereinigten Staaten," *Ergänzungsband Nr. 224 zu Petermanns Mitteilungen*, Gotha, 1936.

¹² Heinz Kloss, "Ueber die mittelbare karthographische Erfassung der jüngeren deutschen Volksinseln in den Vereinigten Staaten," *Deutsches Archiv für Landes- u. Volksforschung*, III (July 1939), 453-474. The reproduction of the maps is excellent.

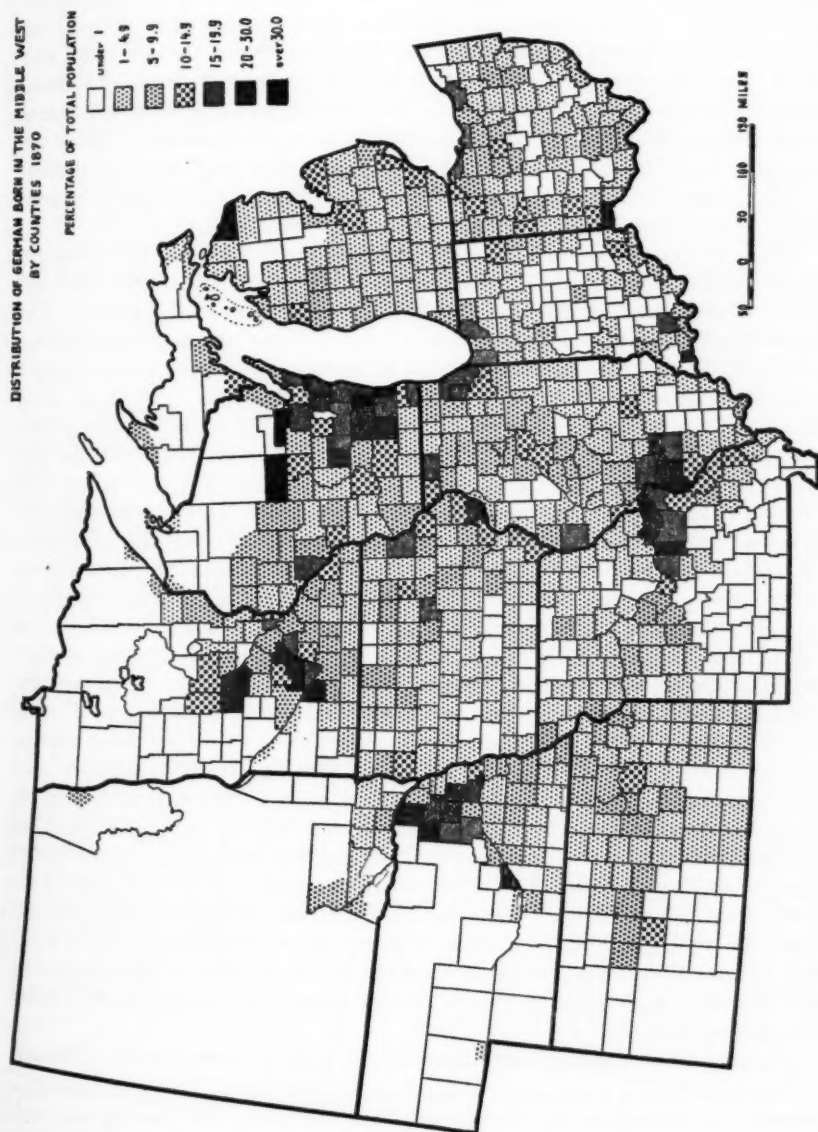


FIG. 1. The percentages were computed from *Ninth Census*, Vol. I, Washington, 1872. Germans lived in 804 out of 831 counties listed in 1870.

just as 1870 is still too early for the Dakotas. North and South Dakota represent a problem which cannot be solved in the scope of this paper. These two states require a different methodological treatment and a later period for consideration because of the *Russlanddeutschen* who, while they form separate groups, should not be studied without regard to immigrants from Germany proper who intersettled with them.¹³ 1870, the first year in which foreign born were enumerated for counties, presents a medium between young areas of new German settlements and mature regions of older settlements. Earlier data will have to be consulted to explain the beginnings of the latter. By 1900 the area of expansion was fairly well defined, German immigration was on the decrease and it is possible to distinguish between regions of expansion and of retreat by German settlers.

After the percentages of German born persons of the total and of the foreign-born population were computed for all counties in the years 1870, 1880, 1890, and 1900, the percentage of the total population was found most informative. The proportion of the foreign born population remains rather stable, with a tendency to increase steadily where Germans settled in homogenous groups, and to decrease where their share in the foreign-born population was small. We cannot learn much about the replacement of original settlers by another nationality group from data relating to foreign-born. Too often this process takes place with the first generation of American born children who are not listed in the census before 1910. To represent the percentage of German born of the total white population might be considered in certain states; for instance, negroes could be eliminated in Missouri and Indians, in parts of Wisconsin, Michigan, and Minnesota. However, in counties where Germans concentrated, neither group was numerically significant.

A differentiation between rural and urban immigrants is not feasible on the basis of available data. Only fifty principal cities in the United States are enumerated as to the nativity of their residents in the census of 1870. Eleven of these with 224,358 German born persons were in the region covered by Figures 1 and 2. Nine of these eleven had a larger proportion of German-born in the total population than the counties where the cities are located (Table II). In 1900, forty-nine cities with more than twenty-five thousand inhabitants could be shown separately on the maps. Of these, thirty had a higher percentage of Germans than the surrounding counties, but in only twelve cases would this difference be shown by the next heavier degree of shading on Figure 2. Only eleven urban areas could be compared for the period from 1870 to 1900. The German population in small towns would still appear as rural. A crude separation of urban and rural settlers based on a few large cities without consideration of Germans in small towns is more misleading than an overall representation which does not claim to distinguish between urban and rural populations.

The shading on Figures 1 and 2 emphasizes areas of concentration. The Ger-

¹³ In North Dakota, forty counties were enumerated in 1900 of which eighteen had a higher percentage of Russian-born than German-born. The two groups were unevenly and widely spread, but not mutually exclusive. Germans had settled in every county; German speaking people from Russia, in all but four counties.

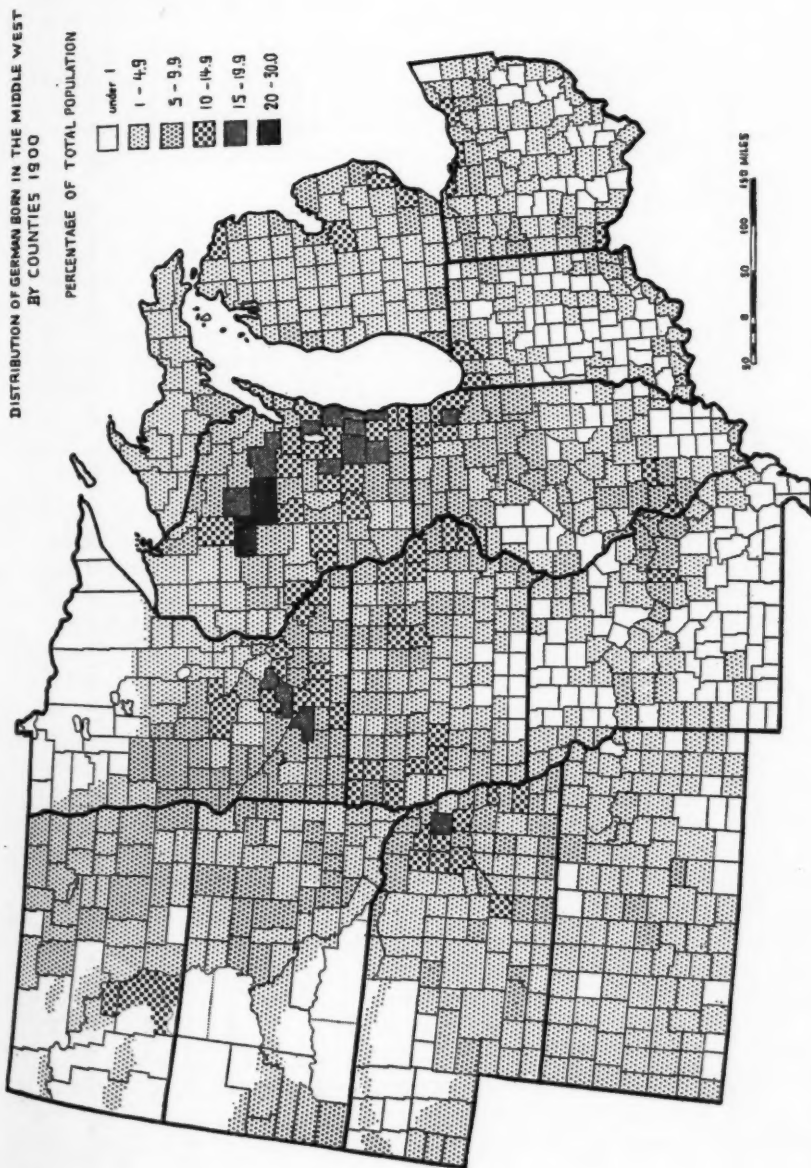


FIG. 2. The distribution of the German born population in twelve midwestern states in 1900. Percentages computed from *Twelfth Census of the United States*, Washington, 1901. German born persons lived in 1023 out of 1025 counties listed in the census of 1900. Settled parts only were shaded approximately in large frontier counties.

TABLE II
German Born in Eleven Cities and Surrounding Counties 1870 and 1900*

City	County	1870			1900		
		Total Pop. (Germans)	%	County (without City) Total Pop. (Germans)	City Total Pop. (Germans)	%	County (without City) Total Pop. (Germans)
Cincinnati	Hamilton	216,239 (49,446)	22.87	44,131 (5,827)	325,902 (38,219)	11.73	83,577 (7,584)
Cleveland	Cuyahoga	92,829 (15,855)	17.08	39,181 (4,079)	381,768 (40,648)	10.65	57,352 (5,139)
Columbus	Franklin	31,274 (3,982)	12.73	31,745 (1,723)	125,560 (6,296)	5.01	38,900 (1,394)
Dayton	Montgomery	30,473 (4,962)	16.28	33,533 (2,424)	25,333 (6,820)	7.23	44,813 (2,604)
Toledo	Lukas	31,584 (5,341)	16.91	15,138 (1,463)	131,822 (12,373)	9.39	21,737 (1,663)
Indianapolis	Marion	48,244 (5,286)	10.96	23,695 (1,250)	169,164 (8,632)	5.10	28,063 (1,007)
Chicago	Cook	298,977 (52,316)	17.50	50,989 (13,132)	1,698,575 (170,738)	10.05	140,160 (18,915)
Detroit	Wayne	79,577 (12,647)	15.89	39,461 (4,413)	285,704 (32,027)	11.21	63,089 (8,257)
Milwaukee	Milwaukee	71,440 (22,599)	31.63	18,490 (6,420)	285,315 (53,854)	18.88	44,702 (10,098)
Kansas City, Mo.	Jackson	32,216 (1,884)	5.85	22,825 (426)	163,752 (4,816)	2.94	31,441 (560)
St. Louis	St. Louis	310,864 (59,040)	18.99	40,325 (6,896)	575,238 (58,781)	10.22	50,040 (4,856)

* Data for cities from *Ninth Census*, I, pp. 388-390; *Twelfth Census*, I, pp. 796-803. Data for counties without cities computed.

man population more than doubled its number through American born children by 1900 in every state of the North Central Division (Table III). The data on

TABLE III
German Born and Children of German Parentage in 1900*

State	German Born	Both Parents Born in Germany	One Parent Native One Parent Born in Germany
Ohio	204,160	331,518	702,578
Indiana	73,546	131,121	283,576
Illinois	332,169	438,964	944,329
Michigan	125,074	167,384	357,629
Wisconsin	242,777	333,759	709,969
Minnesota	117,007	172,051	355,268
Iowa	123,162	177,952	381,716
Missouri	109,282	185,931	399,822
North Dakota	11,546	14,406	32,393
South Dakota	17,873	25,867	55,860
Nebraska	65,506	88,333	191,928
Kansas	39,501	56,172	131,563
North Central Division	1,461,603	2,123,458	4,546,631

*From *Twelfth Census*, pp. clxiii, cxcv, 814.

German-born and their increase through American-born children are given for selected counties and townships in Table IV.¹⁴ The proportion between American-born children and German-born persons in the last column depends on two factors: 1) the age of the settlement and 2) the type of immigration. Townships which received German settlers twenty years before 1860 had almost doubled the German population through children. An example of a young settlement is Berlin township in Marathon County, begun in 1857. By 1860, the increase of the German population amounted to 16.24 per cent; by 1870, to 61.28 per cent. Large immigrant families acquired a smaller number of children in America than did young immigrant couples. Frankenmuth township in Saginaw County, Michigan, provides an example. In regions where the German-born amounted to more than thirty per cent of the total, the German population was apt to be in the majority after ten to twenty years.

Outline maps prepared by the United States Bureau of census for 1870 and 1900 were used as bases for Figures 1 and 2. In order to avoid the area bias which would result from shading large counties on the frontier only those parts were shaded where settlement can be verified from historical sources. The only extreme case of a 100 per cent German county was ignored: in Barton County, Kansas, two Germans constituted the total population in 1870.

In general regions of heaviest German proportions do not coincide with those of heaviest general density, that is, with a density of between seventy-five and one

¹⁴ All township data except those for Westphalia, Clinton Co., Michigan, were obtained by handcounts from the manuscript census records in the National Archives, Washington, D. C.

TABLE IV
German Born and Their Children in Selected Counties and Townships, 1860

State County Township	German Born	Native Born Children			
		Both Parents German		Both Parents and One Parent German	
		Number	Ratio of Increase	Number	Ratio of Increase
			%		%
Missouri					
Perry	1329	1120	84.27	1250	94.06
Brazeau	597	484	81.07	494	82.75
Cinque Homme	391	369	94.37	431	110.23
Cole	1508	1386	91.91	1264	83.82
Jefferson City	527	337	63.95	392	74.38
Marion	23	21	91.30	21	63.94
Jefferson	1431	899	62.82	1084	75.75
Rock	739	477	64.55	538	72.80
Michigan					
Bay	552	263	47.64	307	55.62
Bangor	196	87	44.39	101	51.53
Bay City	279	122	43.73	142	50.90
Saginaw	2557	1660	64.92	1697	66.37
Frankenmuth	465	504	108.39	504	108.39
Kochville	264	207	78.41	207	78.41
East Saginaw	664	288	43.37	302	45.48
Clinton	398	403	101.28	423	106.28
Westphalia					
Minnesota					
Carver	1790	885	49.44	930	51.96
Chaska	251	162	64.54	179	71.31
Brown	832	363	43.63	388	46.63
New Ulm	396	187	47.22	202	51.01
Stearns	1650	1021	61.88	1069	64.79
Wisconsin					
Portage	321	160	49.84	172	53.58
Stevens Point	105	52	49.52	60	57.14
Shawano	158	50	31.65	60	37.97
Marathon					
Berlin	505	78	15.45	82	16.24
Stettin	169	54	31.95	58	34.32
Nebraska 1870					
Hall	334	128	38.32	135	40.42
Cedar	339	180	53.10	234	69.03
St. Helena	260	147	56.54	176	67.69
Cuming	931	608	65.31	666	71.54
T 23 R 4 E	34	8	23.53	8	23.53
T 21 R 6 R 7	414	256	57.66	306	68.92

hundred twenty-five persons per square mile.¹⁵ Germans and the population as a whole concentrated in urban regions, around St. Louis, southwestern Illinois, southeastern Michigan, southeastern Wisconsin, and around Cincinnati, especially along the Miami River. In rural regions German proportions are heaviest where

¹⁵ A map of the density of the U. S. population is found in *Ninth Census*, I, Washington, 1872.

the total population attained only a density of from five to fifteen persons per square mile, or stayed under five persons. It must be kept in mind that Ohio, Indiana, Illinois, and central Missouri were settled comparatively early. The difference between the larger German proportions in new regions and the lower proportions in old regions on Figure 1 does not fully correspond to the real demographic pattern. A number of German immigrants in these four states had passed away by 1870, but their cultural patterns were often kept alive by their American descendants. The map of 1870 reflects the impact on the midwest of the first great wave of German immigration from 1846 to 1854, which brought almost nine-hundred thousand persons to the American shores. It does not reflect the result of the total German immigration of the nineteenth century.¹⁶

German mass immigration of the middle of the nineteenth century consisted mostly of farmers and artisans and laborers. The numerically insignificant group of political refugees after the German revolution of 1848 was decidedly urban in character and went to and stayed in the cities. Most farmers were able to perform some semi-skilled trade, and to the census taker they occasionally gave as their occupation "farmer and wheelwright," "farmer and carpenter," or "farmer and blacksmith." It may be said that the rank and file of this immigration was rural in that "the peasant farmer predominated."¹⁷ But "rural" implied that people were accustomed to village life and to small farming, able and willing to perform a variety of jobs which in this country were more likely to be offered in small towns than on the pioneer farm. These immigrants distributed themselves inland by following rivers and lake shores rather than railroads which became influential for the distribution of settlers later on. Thus the Germans—whether their number is represented absolutely or proportionately—appeared to have followed the Ohio and Mississippi Rivers and the southern shores of Lake Erie and Lake Michigan.¹⁸ That they settled along these main arteries of transportation in larger proportion than the population as a whole is explained not by a peculiar affinity for rivers nor by their preference for bottom land, but by two interdependent factors: this first wave of German immigration spread inland at a period when city growth was linked to river, canal, and lake traffic and when young towns along the Mississippi offered the greatest opportunities. Expectation of finding work as carpenters, grocers, wagonmakers, bricklayers, stonemasons, tailors, printers, clerks, hotel keepers, tailors, or laborers in St. Louis, St. Charles, Davenport, Dubuque, etc., is abundantly attested in lit-

¹⁶ Albert Faust, *The German Element in the United States*, New York, 1927, I, p. 585, estimates this wave at almost 900,000 persons.

¹⁷ Marcus Hansen, *The Great Migration*, Harvard University Press, 1940, p. 289.

¹⁸ On Hannemann's maps solid circles of different sizes are used to indicate the German population in cities and in counties which could not hold the necessary number of single dots. The result is misleading: 1) Central Wisconsin and the counties along the Mississippi are dotted with fair sized towns; 2) "A line of almost uninterrupted German settlement from the mouth of the Ohio to St. Paul along the west bank of the Mississippi" is found by Hannemann, *op. cit.*, 23.

erature.¹⁹ For the same reason, physicians, lawyers, journalists, musicians, teachers, and other professionals belonging to the group of forty-eighters came to the young raw cities of the west which otherwise were less congenial to their way of life than Philadelphia, New York, and Boston. German churches, beer gardens, concert halls, schools, and opera houses appeared after a sufficient number of Germans had come to support them. These expressions of corporate social life were strong factors in swelling initial groups, but the people had to come first.

Not all immigrants had money enough to go immediately to their destination in the interior. After paying for ocean passage and the fare from New York to Albany and thence to Buffalo or Cleveland, they worked there until the savings from several months' wages might get them as far as Cincinnati, already a German center in the middle of the forties. From there they spread northward along the Miami. Farther down the Ohio an immigrant family might get off to meet relatives or friends at Evansville in Vanderburgh County, Indiana. The greater number, however, went through to St. Louis from whence they dispersed in different directions. St. Louis was also the distribution point for those who had come via New Orleans, which had direct shipping routes with Hamburg and Bremen.²⁰ It exerted a lasting influence on the location of German communities in the Mississippi valley. To this day it is the home of some of the most influential German-American organizations.

THE ST. LOUIS AREA

One of the earliest and most widely publicized routes taken by Germans was along the lower Missouri where Duden began the German settlements named after him.²¹ They were enlarged by some members of the so-called Giessen emigration society in 1834. A contemporary witness criticized the general location of the Germans along the Missouri as follows: "Nobody went farther west than Warren County north, and Franklin County south, of the Missouri, and very few were fortunate in the selection of their land. German settlers should have gone about eighty to one-hundred miles farther west where they could have found generally better and more level land. Western Warren County and the southern part of Montgomery County and Gasconade, Cole and Osage Counties are no better, rather much wilder

¹⁹ These occupations are typical among Germans in towns. Many histories of settlements are found in *Der Deutsche Pionier*, I-XVIII, Cincinnati, Ohio, 1869-1888, and in the early volumes of *Deutsch-Amerikanische Geschichtsblätter*, Chicago, 1900-1932.

²⁰ Bremen rivaled Le Havre by 1843 as embarkation port for emigrants due to its need for return freight after it had become the most important tobacco importer for central Europe. Since the hinterland of Baltimore did not offer enough opportunities for German immigrants, the latter wanted to land farther west and Bremen ships called regularly at New Orleans by the end of the forties.

²¹ Gottfried Duden purchased roughly two hundred and seventy acres above Femme-Osage Creek close to the Missouri in Montgomery County, later set off as Warren County, in 1824. His famous book *Berichte über eine Reise nach den westlichen Staaten Nordamerikas* . . . , Elberfeld, 1829, was reprinted in St. Gallen, 1832, and in Bonn, 1834. Most of the settlements in Montgomery and Warren Counties avoided bottom land, see "Foot-Tour through Missouri in 1833" in Thomas J. McCormack, ed., *Memoirs of Gustave Koerner*, I, Cedar Rapids, 1890, pp. 312-322.

and more broken up than the region where the first German pioneer settled."²²

In spite of the selection of inferior land for farming the German settlements persisted although the land was rarely cultivated by the original German pioneers of the late twenties and early thirties who were highly educated and without agricultural background or training.

The town of Hermann in Gasconade County was founded in 1835 by a German settlement society from Philadelphia. In 1860 all residents of the town were German-born or children of German parents. From here German farmers had spread into Roark township to the south and Bolvares (Boulware of today) to the southwest. Richland on the Missouri west of Hermann had a mixed population. An influx of Hanoverians during the late fifties had almost Germanized Third Creek township farther south. But only one family had settled in Brush Creek and two families in Bourbon township along the southern border. In other words, the present pattern of settlement, which Arthur Cozzens found solidly German in the northern two thirds of the county, was completed by 1860.²³

Farther up the Missouri in Osage County bordering Gasconade, Germans had come too late to occupy river townships, but the town of Westphalia, away from the river, was 100 per cent German in 1860. From that town about half of the land between the Osage River and Marris Creek was occupied by Germans.²⁴ Cole County representing the westernmost expansion of Germans in the early thirties numbered roundly fifteen hundred German-born in 1860. Of these more than half lived in Jefferson City and adjoining Liberty township on the Missouri. Only a small number had gone into the townships along the western border although there had been a constant influx into Cole since 1842.²⁵ By 1870 no significant expansion beyond the originally favored areas along the Osage River and around Jefferson City had taken place, and by 1900 the proportion of Germans in the total population farther up the Missouri was low and had decreased in some counties. Where the westward push by German pioneers along the Missouri came to a standstill a hundred years ago it was not renewed later on.

The river counties south of St. Louis along the Mississippi were also sought by Germans to a somewhat lesser degree than the counties along the lower Missouri. There were fewer urban centers like St. Charles and Jefferson City to attract them. Apple Creek, which serves as a boundary line between Perry and Cape Girardeau

²² From Gert Göbel, *Länger als ein Menschenleben in Missouri*, St. Louis, 1877, p. 22. An excellent contemporary evaluation of Duden's book by Gustave Koerner with the passages censored in the original German publication of 1834 is reprinted in *Deutsch-Amerikanische Geschichtsblätter*, XVI, 1916, 280-333.

²³ Arthur Cozzens, *op. cit.*, p. 290.

²⁴ In Osage County in 1860, all 33 families in Westphalia were German; 23, were German of a total of 168, in Benton township; 60, of 332, in Crawford; 125, of 198, in Jackson; 26, of 161, in Jefferson; 108, of 248, in Linn; 198, of 240, in Washington.

²⁵ Of 1508 German born persons in Cole County in 1860, 895 lived in Jefferson City and Liberty township. The three townships along the western border, Marion, Moreau and Clark, numbered 265 German born. Of 1126 native born children of German parentage in Cole County, only 51 were not born in Missouri.

Counties runs through a region densely settled by Germans. Those south of the creek in Appleton township in Cape Girardeau County had come mostly from Hanover and Bavaria and formed a strong German Catholic community. North of the creek two thirds of the Germans counted in Perry County in 1860 formed the Old Lutheran settlements around Frohna, Altenburg, and Wittenberg in Brazeau and Cinque Homme townships (Table V).

TABLE V
German Born in Perry County, Mo., 1860

Township	Total Population	German Families	German Born	German Stock	
				Number	Per cent of Total Population
Bois Brulé	1034	28	79	134	12.96
Brazeau	2131	204	597	1081	50.73
Cinque Homme	2653	145	391	760	28.65
Perryville	336	18	58	108	32.14
Saline	1215	5	13	23	1.89
St. Mary's	2105	67	191	343	16.29

The "Old Lutherans" from Saxony protested the enforcement of a Prussian state decree for the Union of Protestant churches of 1817 and emigrated to form a Lutheran settlement in the United States. Not all of the six hundred and fifty persons who left Germany in November 1838 arrived in New Orleans in February 1839. One of the five chartered boats was lost. In St. Louis a number of the immigrants who were skilled in a trade found employment and gave up the idea of farming. After weeks of inquiries better land closer to St. Louis was rejected in favor of several sites amounting to 4,472 acres in Perry County, purchased partly from the government, partly from private parties. For the landing at Wittenberg—a narrow strip of bottom land about a quarter of a mile wide and half a mile long—the settlers paid an extra one thousand dollars²⁶ (Fig. 3). The access to the Mississippi which determined the location in Perry County was mentioned by some contemporaries as about the only redeeming feature in the purchase of uncleared wilderness land. The Old Lutherans were satisfied with the undulating wooded land and the clayey soil. The high grass in the hardwood forests was valued as fodder; corn and wheat grew rather well; and forage crops could be neglected as long as woods were available for grazing. The climate so different from that in Saxony brought sharper complaints. One of the first settlers wrote: "Experience taught us that fever is far more frequent in lower regions. In Altenburg we are on higher land and therefore our loca-

²⁶ The author is indebted to E. M. Lottes of Altenburg for information and location of the plat map on which Fig. 3 is based. Sources used aside from manuscript census are, *Zum Fünfundsiebzigjährigen Jubiläum der ev.-luth. Gemeinde Altenburg, Frohna, und Wittenberg, Perry County, 1914*, pp. 10, 30, 34, 36, 51. *Celebrating the 100th Anniversary of the Saxon Immigration 1839-1939*, Cape Girardeau, Missouri, 1939. *Atlas of Perry County*, Chicago 1915. Thomas J. McCormack, *op. cit.*, p. 470. Manuscript records and jubilee publications of churches otherwise not accessible were used in the Concordia Historical Institute, St. Louis.

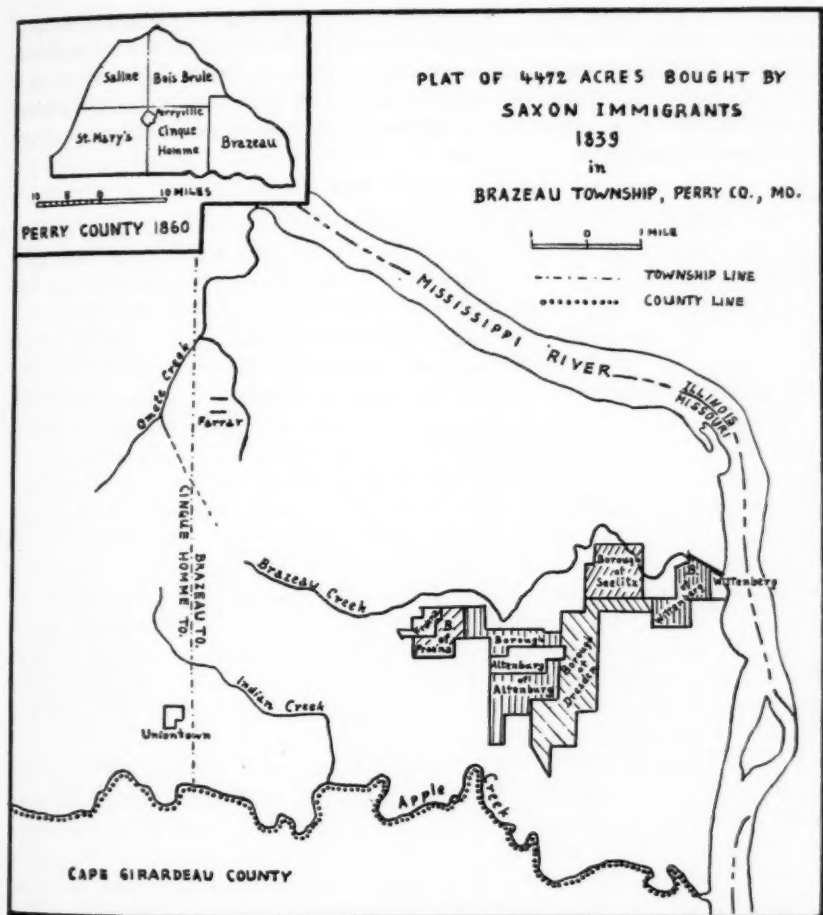


FIG. 3. The Old Lutheran Settlements in Perry County, Missouri. Farrar and Uniontown were daughter colonies. The original plat map is in the possession of the Perry County Historical Society. This map was derived from the plat and three quadrangles of eastern Perry County published by the Geological Survey, Washington, D. C.

tion is considered the healthiest of all although fever will occasionally occur."²⁷

The settlers found work on older American farms along Brazeau Creek and received additional help from their old companions in St. Louis. More immigrants who arrived in December 1839 settled around Uniontown between Apple Creek and Indian Creek again on upland. Shared religious faith accounts for reinforcements

²⁷ Translated from a letter written in 1839 by J. F. Winter, teacher in Altenburg.

during the forties and fifties.²⁸ The Lutheran settlements expanded to Farrar in Salem township in 1859 and into Cinque Homme township where they founded new parishes. Their homogeneity and endurance is based on German Lutheranism as it is represented by the Missouri Synod of today. Concordia College, the training institute of its ministers, had its beginning in the parsonage of Altenburg from where it was moved to St. Louis.

SOUTHEASTERN ILLINOIS

The concentration of Germans in southeastern Illinois began in the early thirties. It resulted from the Germans' preference for St. Louis as a stopping place and their disappointment with the Duden settlements. A few persons of German descent had bought government land before 1818 in St. Clair, the oldest county in Illinois and the most densely settled.²⁹ The oldest farms were situated on the uplands of St. Clair County, on "Turkey Hill." In 1820, a German philanthropist had brought about ninety countrymen to Vandalia, the capital of Illinois on the Kaskaskia River in Fayette County.³⁰ Artisans, farmers, and brewers are reported among the group which did not develop much power to draw more immigrants, due probably to the early loss of its leader. Members of this group had passed on their way to Vandalia over the Looking-Glass Prairie, about six to ten miles wide, extending about twenty miles north of St. Clair into Madison County between Sugar and Silver creeks.³¹ Their reports reached a Swiss immigrant society in St. Louis in 1831; the leader of this society had been fascinated by Duden's book on the German settlements in Missouri. Shocked by slavery in Missouri and frightened by mosquitoes, heavy woods, and swampy bottoms in the Duden settlements, the Swiss decided to go to Illinois. They bought their first 459 acres from a native American who had located on the edge of the prairie. The wooded hill tops along the edges of Looking-Glass Prairie were the first to be taken up by native American settlers. The Swiss proceeded via Edwardsville, Madison County. A witness of the first arrival of the Swiss on the old American farmstead reports that the undulating prairie with occasional groups of trees found the immediate acclaim of the whole group since here were "neither the heavy woods of Missouri nor monotonous and infinite level prairies."³² The Swiss colony, New Helvetia, grew consistently and expanded in area.

²⁸ Of 204 German families in Brazeau township in 1860, 96 had come from Saxony; 42 from Prussia; 25 from Hannover; 12 from Bavaria, i.e., Protestant Franconia; 12 from Hessen; 6 from Baden; 9 from Württemberg. The settlers bought the large tract because they intended from the beginning to keep "non-believers" out.

²⁹ Margaret Cross Norton, "Illinois Census Returns, 1810, 1818," *Collection of the Illinois State Historical Society*, XXIV. Springfield, Ill., 1935.

³⁰ "Ferdinand Ernst," *Deutsch-Amerikanische Geschichtsblätter*, X, July 1910, 187-189.

³¹ For a description of different prairies in St. Clair and Madison counties, see H. L. Ellsworth, *Illinois in 1837*. Philadelphia, 1837, pp. 105-106.

³² Salomon Köpfler and Jacob Eggen, "Die Schweizer Kolonie Highland, Illinois," *Deutsch-Amerikanische Geschichtsblätter*, V, January 1905, 58.—The selection of Looking-Glass Prairie is quoted by Faust, *op. cit.*, II, 55 as an example of German adaptability and readiness to farm on prairies. One of the early settlers, Adolph Eugen Bandelier, in "Highland Illinois," *Der Deutsche Pionier*, XI, Cincinnati 1879, 265, says that the Swiss "felt they would suffocate in the

The town of Highland was founded in 1837 in expectance of a railroad from Alton to Mount Carmel on the Wabash. Meanwhile the settlers profited from the market in St. Louis where they sold cheese, pottery, and diverse garden products. A brick kiln and a flour mill were the economic mainstays of Highland.

More significant were the Belleville settlements of the "Latin farmers" who began to arrive in 1833. These were political emigrants of academic background and members of the Giessen emigration society, which expected to go to Missouri. But they were discouraged when they observed incidents of slavery in practice in St. Louis and when their scouting parties found that good "congressland" for one dollar and a quarter per acre was almost unobtainable in the Missouri River counties. They found the bottom lands unhealthy and the uplands, not fertile though better aired.³³ Thus they ferried across to Illinois and continued on the stage road via Belleville to Nashville which ran along the low ridge on the northwest border of a small prairie, which lay lower than the surrounding woods, an unusual occurrence in southern Illinois (Fig. 4).

No creek ran through Loop Prairie which the "Latin farmers" selected. Land bordering Silver Creek was avoided since the stream was shallow and swampy, and flooded frequently. Good top soil ranged from two to fifteen feet depth on the prairie, but was only a few inches thick on the wooded uplands in the northwestern and southeastern corners of Shilo Valley township. The price of the land varied from five to ten dollars an acre depending on the quality of buildings on the farms. None in the original group knew much about farming. Almost all bought improved farmsteads ranging from thirty to three hundred acres in size from Americans. Four years later, about thirty farms in Shilo Valley township were owned by Germans, all educated people, who preferred growing flower gardens and fruit trees to raising cattle and cultivating fields. Quite a few members of the original group who were unsuccessful as farmers returned to urban and professional life in Belleville. But the fame of their settlements attracted more German immigrants who acquired land on the southeastern uplands extending through Madison, St. Clair, part of Monroe, and Washington Counties to a narrow point at Kaskaskia in Randolph County, for a length of about one hundred miles. The townships bordering the Mississippi between Alton and Chester were mostly bottomland and were avoided by German settlers.³⁴ Nor did many of them go into the southern tip of the state formed by the

woods, man breathes easier in the open as he does on the alp and on the ocean," and selected open land because they wanted meadows for their cattle.

³³ The best contemporary description of the Belleville settlements was by the noted German-American *Amerikanische Geschichtsblätter*, XVI, 248-333. The map from *Westland* and one by Friedrich American botanist Georg Engelmann in *Westland*, Heidelberg, 1837, republished in *Deutsch-Th. Engelmann in Deutsch-Amerikanische Geschichtsblätter*, III, April 1903, p. 58 were used in the construction of Fig. 4.

³⁴ The river townships of Monroe were completely avoided by Germans while more than half of the population on the upland around Waterloo and in the town of Waterloo was German by 1870. In Randolph County German farmers settled northeast of Chester, in Bremen and Wine Hill townships of today. Only the small river towns, not the rural townships, had a small German population in 1860; 10 of 22 families in Prairie du Rocher were German; 5 of 46, in Menard; 12 of 76, in Kaskaskia.

confluence of the Ohio and Mississippi.

In other parts of Illinois Germans made varied selections. Valuable prairie soil was selected by Friesians around Ost-Friesland, now Golden, in the northeast corner of Adams County.³⁵ Good prairie land was rejected by Catholic Germans from Hannover and Westphalia who began as laborers on American farms around Germantown in Clinton County and then settled on poor and swampy land along creeks during the thirties. High German Catholics who arrived later bought left-over prairie land in the older parts of St. Clair County.³⁶ The agents of a land company formed by German Catholic laborers in Cincinnati bought partly wooded land around Teutopolis in Effingham County, after having investigated Missouri. The Germans valued timbered land so highly that they resolved to honor claims for additional church land made by those members who had more than fifteen acres of prairie in their allotment.³⁷ No consistent preference is discernible in the history of many first locations. German participation in the settlement of counties in central Illinois was a result of many German arrivals in the fast growing city of Chicago and of the natural responsiveness of these arrivals to economic opportunities in general which were offered by the building of the Illinois and Michigan Canal and the Illinois Central Railroad.

THE IOWA RIVER COUNTIES

The absolutely and proportionately large number of Germans in the river counties of Iowa supports the idea that Germans settled on fertile river lands. Suspicion of this generalization is aroused by the circumstance that only those river counties which have a significant river town show heavy German proportions. This is also observed in Adams County with Quincy on the Illinois side, the only river county north of Belleville where Germans reached fifteen per cent (15.63) of the total population in 1870.³⁸ A count of German families in 1860 in the counties Allamakee, Dubuque, Clinton, Muscatine, and Scott revealed their strength in river townships with cities and in certain inland townships which in most cases were either adjacent

³⁵ H. H. Emminga, "Neu Ost-Friesland," *Deutsch-Amerikanische Geschichtsblätter*, XII, 1912, 545-556. The soil of this settlement is among the most fertile in Illinois and was claimed to have increased its value two hundred times within two generations, i.e., in 65 years after the first purchase of 160 acres for 248 dollars.

³⁶ *Program and Souvenir of the Centennial Celebration of the Catholic Settlement of Clinton County, Ill.*, Germantown, 1933, pp. 20-31. These German Catholic settlements now extend over twelve parishes.

³⁷ Sister Mary Gilbert Kelly, *Catholic Immigrant Colonization Projects in the United States, 1815-1860*, United States Catholic Historical Society, Monograph Series XVII, 132-135. The village Teutopolis in the northeast corner of Effingham County lies directly on the old National Road from Terre Haute to St. Louis. By 1860, only Teutopolis and St. Francis township had a heavy German population. Only five Germans were counted in the whole western half of the county.

³⁸ The first German church in Illinois was founded in Quincy in 1837. For beginning of mills and settlement around Mill Creek, south of Quincy, see *Deutsch-Amerikanische Geschichtsblätter*, XII, 1912, 536-544.

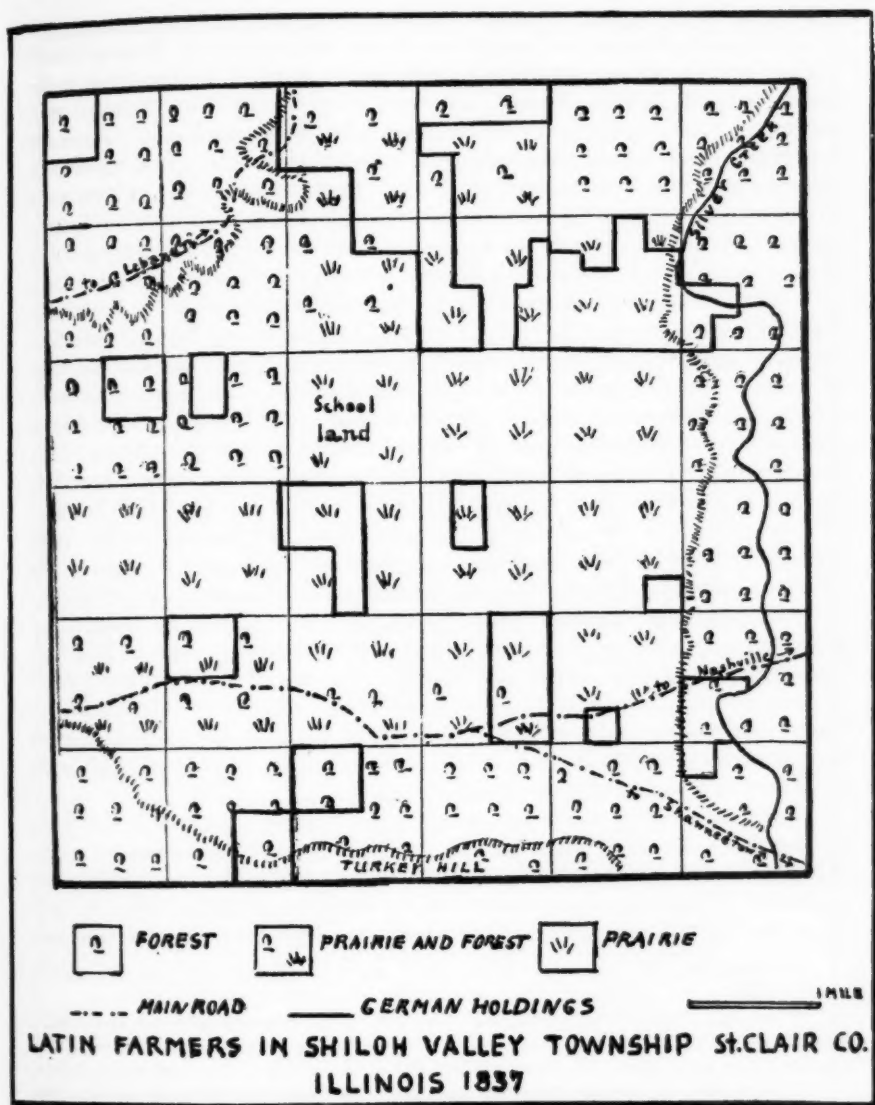


FIG. 4. "Township I, north of the Baseline Range 7, west of the 3rd principal Meridian" was mapped for German readers by Fr. Th. Engelmann in 1836 and Dr. Georg Engelmann in 1837. The map is a simplified and combined version of both.

to an urban river township or connected with it by roads.³⁹ Figure 5 shows the proportionate distribution of German born in the river counties of Iowa in 1856.⁴⁰ In this year German-born amounted to more than a fourth of the population in the townships of Madison, Burlington, Muscatine, Davenport, Clinton, Dubuque, and Guttenberg, following the river from south to north. Every town served as a center of distribution for Germans who advanced inland and onto the upland rather than spreading along the river between the towns. Bottom land either had been taken up earlier or was avoided for misunderstood reasons of health. Bottom land became attractive when it offered easy access to good hinterland beyond the bluffs, and that meant a landing place. Guttenberg in Clayton County was the one strictly German river town. Its site was not discovered by Germans, but was known to French settlers as Prairie la Porte. The agent of the "Western Settlement Society" from Cincinnati acquired first all privately owned lots before he bought the main site from the county. The German society stipulated that town lots must be sold to Germans only.⁴¹ Rural German settlement originated mostly with groups, who wished to stay together and hoped that more countrymen would join them in the future. Thus they preferred relatively thinly populated regions where large tracts for immediate purchase and vacant land in between for later acquisition were available. The German socialist colony "Communia" in Clayton County on Volga and Turkey creeks five miles south of Elkaeder located in a wilderness in 1850 for reasons of space. The eminently successful Amana colonies in Johnson and Iowa Counties along the Iowa River began with the purchase of eighteen thousand acres in 1855.⁴² The agents of a German Lutheran group, which founded the Iowa Synod, traveled in 1853 from Michigan via Galena to Dubuque on their way to the land office in Iowa City. When they heard that "good wooded land on the edge of the prairie could be bought in large tracts" fifty to sixty miles northwest of Dubuque at one dollar and a quarter per acre, they took this hilly land around St. Sebald north of Strawberry Point in the southwestern corner of Clayton County.⁴³

Inland townships of river counties had a rural population although they had a number of small villages which are not separately listed in the manuscript census. But the occupations indicate village residence and a small non-farming rural German population is contained in most heavily shaded inland townships on Figure 5. Still, the seven river counties mentioned above had a far greater proportion of urban resi-

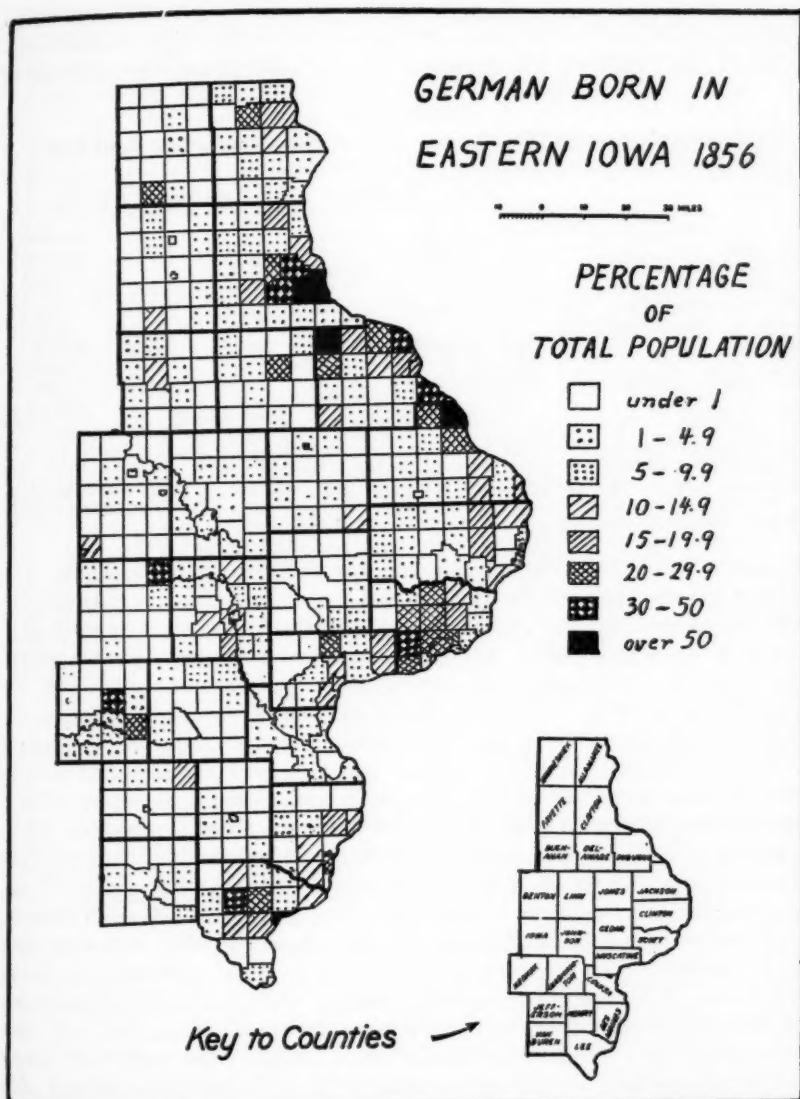
³⁹ A handcount of German-born persons was found to be impossible in Iowa as in Illinois, even in 1860.

⁴⁰ The *Iowa State Census of 1856*, Iowa City, 1857, is the only printed source of nationality data for townships. While inaccuracies in tabulations are frequent and the data are very poorly arranged, it is serviceable. All sums on which Table VI and Fig. 5 are based were recounted.

⁴¹ Joseph Eiboeck, *Die Deutschen von Iowa und deren Errungenschaften*, Des Moines, Iowa, 1900, pp. 528-530.

⁴² *Ibid.*, pp. 96-101, 102-116.

⁴³ George J. Fritschel, *Aus den Tagen der Väter. Geschichten aus den Anfangszeiten der Iowa-Synode*, Wartburg Publishing House, 1930, pp. 99-107. Wartburg Seminary, the training institute of the Iowa Synod, was first in St. Sebald, moved to Dubuque in 1853, back to St. Sebald in 1857, and has been in Dubuque since 1889.



dents than had either the counties inland or those counties on the river which had no significant river town. In the same way, the majority of the people in inland counties were rural. Thus, the percentage increases on Table VI are to be understood as

TABLE VI
Growth of Germans and Non-Germans in Seven River Counties and Rural Iowa

	German Population			Non-German Population		
	1856	1870	Increase (per cent increase)	1856	1870	Increase (per cent increase)
Seven River Counties (with significant town)*	20,792	32,659	11,867 (57.07)	115,265	194,191	78,926 (68.47)
Rural Iowa	9,250	33,501	24,251 (261.17)	364,104	933,669	569,565 (156.43)
Total Iowa	30,042**	66,160	36,118 (120.23)	479,369	1,127,860	648,491 (135.28)

* The seven river counties with their respective towns are from south to north: Lee with Keokuk and Madison; Des Moines with Burlington; Muscatine with Muscatine; Scott with Davenport; Clinton with Clinton/Lyons; Dubuque with Dubuque; Clayton with Guttenberg.

** This figure is based on computation by townships as listed in *The Census Returns of the Different Counties of the State of Iowa for 1856*. Iowa City, 1857.

increases in mainly rural and mainly urban counties between 1856 and 1870. The Germans increased proportionately less than the non-Germans in the river counties. Their increase in rural Iowa was far higher than that of non-Germans in either all of Iowa or in the river counties. This same phenomenon was observed on a smaller scale in the river towns and rural river townships along the Minnesota River between 1860 and 1870.⁴⁴ The detailed investigation of the rural portions of the counties and the county seats along the Minnesota River and the general comparison of river counties and rural Iowa indicate that German immigrants first went to towns and cities where they filled the demand for workers and small business. Three circumstances contributed to the slowing of German increases in the towns. First, demand in general became saturated. Second, special opportunities existing in German communities decreased; a town could provide only a limited number of jobs for craftsmen, bakers, butchers, innkeepers, etc., catering to a German clientele. Third, the crisis of 1857 disillusioned German laborers in cities even more than German farmers. Such dissatisfaction with life in American cities frequently led to the formation of German rural settlement societies. Two general factors influencing German distribution in towns and on the farms are noted. First, there must have been a considerable number of persons of urban or semi-urban background among the nine hundred thousand Germans who came to the United States between 1846 and 1854, not counting the political refugees. Marcus Hansen indicated this after his investigation of emigration records in Germany. Second, rural immigrants who intended to farm and did not have enough money to buy land immediately after ar-

⁴⁴ Hildegard Binder Johnson, "Factors Influencing the Distribution of the German Pioneer Population in Minnesota," *Agricultural History*, XIX, January 1945, 41-43.

rival also lived in towns temporarily as long as the latter offered employment. The generalization that Germans settled along the Mississippi reminds one of the statement that rivers flow by large cities. German distribution was affected by the location of cities and towns which indeed were on the rivers.

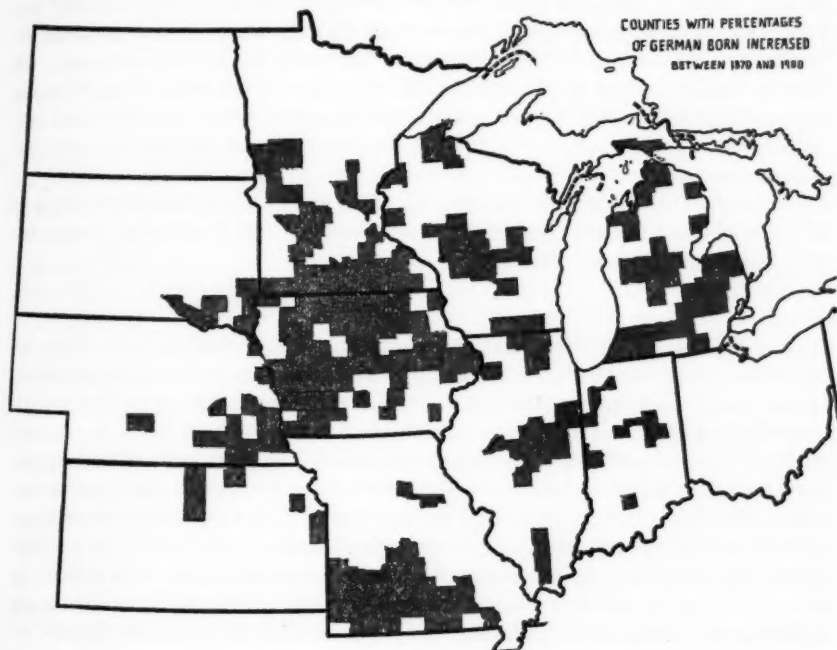


FIG. 6. Figures are significant to three places. The result of the map is misleading. Minor increases in southern Missouri (for instance, Barry County with 0.009 to 0.95 or Newton County with 0.59 to 0.80 per cent German-born) should be distinguished from significant increases in other regions, for instance in Wood County (7.64 to 13.68), Adams County (2.01 to 4.19), and Juneau (4.19 to 7.84) in central Wisconsin south of Marathon County.

FRONTIER SETTLEMENTS

Four regions with heavy German proportions in 1870 were eastern Nebraska, central Minnesota, southeastern and northcentral Wisconsin, and the Saginaw country in Michigan. In 1900, these core areas were still recognizable; their demographic pattern has been preserved to the present. Four of them were on the frontier in 1870. Population density was less than five persons per square mile in some German counties in Minnesota and Nebraska, but not more than forty anywhere. The core areas are adjacent to counties where the number of German-born not only increased absolutely, but also proportionately between 1870 and 1900 (Fig. 6). In view of the drop of German immigration after 1890 and of its increasingly urban

character during the eighties, it is noteworthy that German proportions increased in rural areas. More noteworthy is the location of these proportionate increases. In Nebraska they are almost all south of the Platte River and no further west than Hall County, the outpost of the core area in 1870. In Minnesota, they extend toward the Red River Valley into which pioneer settlement advanced between 1870 and 1900; older counties southeast of the core area show an equally large number of increases. In Wisconsin, German proportions increased south of the core area. In Michigan, they formed a crescent around the Saginaw country. Thus Germans spread in proportionately larger numbers into regions of older settlement and into areas connecting their outposts with more densely populated counties than into new frontier areas.

The factors which influenced the distribution of German pioneer settlements in Minnesota have been discussed in detail elsewhere.⁴⁴ The three other frontier regions deserve further attention.

Eastern Nebraska

In 1856, one hundred and forty-two German families lived in the territory of Nebraska, mostly in Dakota, Douglas, and Otoe Counties, all on the Missouri River, but far apart.⁴⁵ The concentration of German settlements in eastern Nebraska north of the Platte River resulted from a combination of factors. Grand Island, the outpost in Hall County, was founded in 1857 at a time when it was not generally known how much land the Pawnee Indians had ceded north of the Platte, and when most of the land south of the Platte was claimed by the Sioux. The first German immigrants traveled from Omaha along the old Mormon trail on the north bank. The winding Platte is divided into many channels completely unnavigable and very difficult to ferry so that the south bank road was entirely separate. The road from Omaha via Columbus on Loup River and Grand Island near Wood River to Fort Kearny became the traditional route of German settlers after 1857.

The story of the founding of Grand Island in that year has some significant details.⁴⁶ The Germans had an experienced leader in William Stolley, who was at home on the prairie and won the confidence of the commander at Fort Kearney so that the German farmers could sell surplus corn to the garrison and get seasonal work at the fort during the first winters. In 1864 many of the Platte Valley settlers fled their farms because the garrison at Fort Kearney, reduced in number because of the Civil War, was no longer able to protect them against the Indians. None of the roughly two hundred German farmers left; they found shelter in a log fort at Grand Island which had been planned by Stolley during the preceding years. The original Grand Island party consisting of thirty-five persons including five Americans had been organized in Davenport, Iowa. The whole project was financed during the first two years by an Iowa banking firm which had been advised of the availability of

⁴⁵ Mary Ann Jakl, "The Immigration and Population of Nebraska," *Master Thesis* (type-written), University of Nebraska, Lincoln, Nebraska, July 10, 1936, p. 99; data in appendix.

⁴⁶ The best account of the founding of Grand Island is by William Stolley, "History of the First Settlement of Hall County, Nebraska," *Nebraska History*, Special Issue, April 1946.

former Pawnee land as far west as Hall County and of the probability that the future Pacific railroad would run along the Platte Valley. The contract between the "Town Company" and the settlers provided that each member take out three hundred and twenty acres, half of which were to be returned to the company. The latter paid for all expenses of surveying, outfitting the transport, and for supplies during the first year. Each settler was also entitled to ten lots in the new town which was laid out between the present site of Grand Island and the north channel of the Platte River, about seven miles below the mouth of Wood River. Connection with the outside world depended on the north bank road and was interrupted whenever ferrying across Loup River was impossible.

The first Germans were farmers and laborers who took out land between the town and the main channel in Washington township of today under squatter rights. The first legal entry of land bought from the government was not made until 1866. Germans kept close to the river and advanced in a southwesterly direction toward Wood River where timber stands were considerable. The Union Pacific railroad, which reached Grand Island in 1866, brought economic advantages to the townspeople, but great hardships to those farmers who had some timber so highly valued by settlers on the prairie. Construction gangs cut down timber where they found it disregarding the property rights of farmers. The losses spurred farmers to the replanting of trees, recommended by Stolley and a few others before the railroad came. Fruit and vegetable gardening became a significant sideline for several grain and livestock farmers in the seventies.⁴⁷ Finally, most of the pioneers in Grand Island were Schleswig-Holsteiners of whom many had come to Davenport since the middle forties. They attracted many countrymen and by 1870 almost two-thirds of the Germans in Hall County, many recent arrivals among them, were from Schleswig and Holstein.⁴⁸

The German settlements in eastern Nebraska were rather spotty and in Pierce and Cedar Counties as close to the frontier and Indian reservations as in Hall County (Fig. 7). In Cedar, settlers were grouped around two landing places on the Missouri. All Germans were farmers in 1870 and had located close to creeks. Brooks township, as it is listed in the census of 1870, never was a township but a separate settlement of seven families from Prussia known as Brockey's bottom.⁴⁹ Pierce County was an outpost of German pioneers who had partly come with a group of over one hundred persons from Wisconsin and had claimed at first a site around Norfolk along the banks of the north branch of the Elkhorn River in the northeast

⁴⁷ *The Official Atlas of Nebraska*, Philadelphia, 1885 contains records of many farmers, their location in sections, and agricultural production for almost every county.

⁴⁸ Of 334 German born in Hall County in 1870, 205 were born in Schleswig-Holstein; 52, in Prussia; 40, in Mecklenburg; 10, in Hannover; 9, in Bavaria; 6, in Baden; 3, in Bremen; 2, in Darmstadt; one each in Waldeck, Hessen, Württemberg, Saxony, Hamburg, Austria and "Dänemark."

⁴⁹ Precinct Brocke in manuscript census of 1870, listed as Brooks township in *Ninth Census*, 1872, p. 196, had eighteen German born persons, two married to Americans, nine purely German and four at least half German children. Information from Miss Lenora Laughlin of St. Helena and Mrs. Edna T. Eby of Hartington, Cedar County.

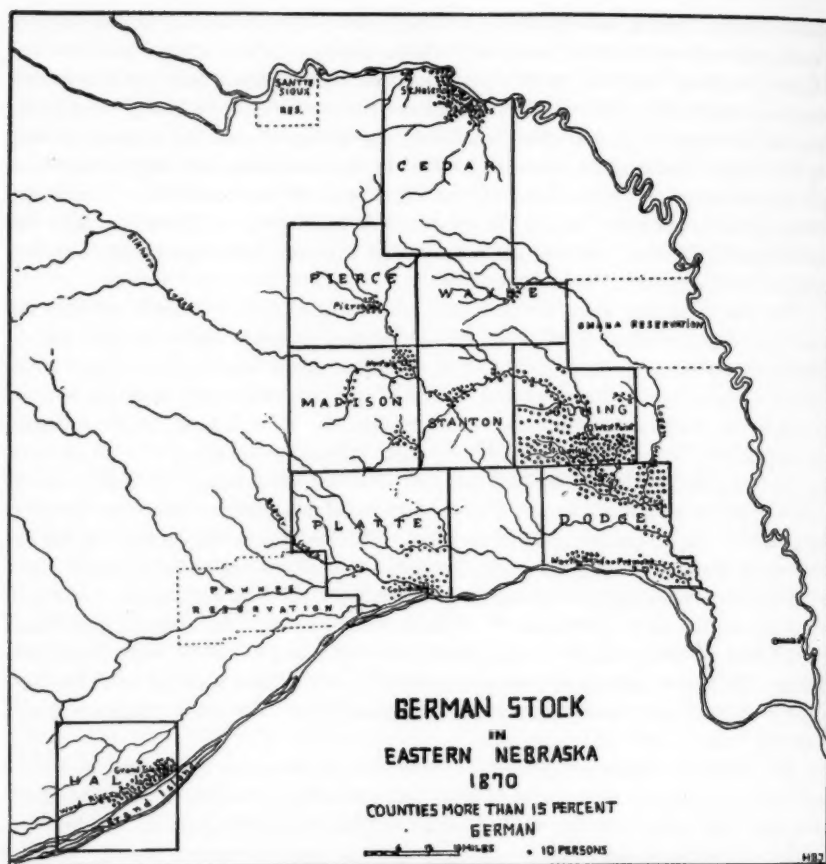


FIG. 7. A Map of Nebraska published by the Nebraska State Board of Immigration in Omaha, Nebraska, 1871, in the possession of the Nebraska State Historical Society at Lincoln served as base. The number of settlers was obtained through a handcount of manuscript census records, their location was determined from historical sources and records of settlement contained in *The Official Atlas of Nebraska*, Philadelphia, 1885.

corner of Madison County. They, too, had used the old Mormon trail, and then proceeded along the Elkhorn River. The first entry in Pierce was made in South Branch township along a creek near Hadar. Several creeks near Pierce attracted the next group of Germans from Wisconsin. The explanation of the layout of their farms is contained in the information by the daughter of a pioneer settler who arrived in 1869; "Father wanted as much river as possible."⁵⁰

⁵⁰ Information by Esther Kolterman Hansen, of Pierce, Nebraska, author and publisher of *Along Pioneer Trails* in Pierce County, Nebraska, 1940.

The desire to obtain water and timber for fuel and building usually available along creeks characterizes all pioneer settlement in eastern Nebraska. This was the reason for its advance along Elkhorn and Logan rivers. The number of Germans who carried on business or trades in the towns of West Point in Cuming, Columbus in Platte, and Fremont in Dodge County, was not disproportionately large (Table VII). The great majority of Germans came to farm and settled together in

TABLE VII
Minor Civil Divisions in Counties with More than Fifteen Per Cent
of German Born in Nebraska, 1870

County	Precinct	Total	German Born	Per Cent From Total	German* Stock	Per Cent From Total
Cedar	Brocke	40	18	45.00	27 (4)	65
	St. James	327	61	18.65	85 (21)	25.99
	St. Helena	665	260	39.10	407 (29)	61.20
Cuming	Township 21 + 22					
	Range 4 5	626	330	52.72	591 (4)	94.41
	Township 21					
	Range 6 7	2032	414	20.37	670 (50)	32.97
	Township 23 R4E	72	34	47.22	42	58.33
	" 23 R5E	232	63	27.16	118 (3)	50.86
	" 23 R6E	144	28	19.44	39	27.08
	" 23 R7E	108	41	37.96	48 (11)	44.44
	" 24 R4E	156	12	7.69	15	9.55
	" 24 R5E	84	8	9.53	15	17.86
	" 24 R6E	15	1	6.67	1	6.67
	" 24 R7E	15	1	6.67	1	6.67
Dodge	Fremont	2898	170	5.87	225 (20)	7.76
	Logan	723	287	39.70	378	52.28
	Maple	456	63	13.82	94 (1)	20.61
	North Bend	809	50	6.18	93	11.50
	Pebble	521	239	45.87	302 (9)	57.97
Hall	Precinct 1	650	233	35.85	316 (3)	48.62
	Precinct 2	213	98	46.01	139 (4)	65.26
	Precinct 3	194	3	1.55	7	3.61
Madison	Battle Creek					
	Norfolk	1133	255	22.51	446 (8)	39.36
	Union Creek					
Platte	Butler	328	73	22.26	111 (4)	33.84
	Columbus	1759	245	13.93	331 (8)	18.82
	Monroe	338	35	10.36	37	10.95
Pierce		152	108	71.05	138 (1)	90.79
Stanton		636	180	28.30	289 (8)	45.44
Wayne		182	44	24.18	62	34.07

*At least half German children of mixed marriages in ().

certain townships practically avoiding others. A considerable number had previously lived in other states and did not come to Nebraska directly from Germany. This is reflected in literature, in the stories of pioneer descendants, and it is proved by the great number of children born to German parents in other states of the Union, particularly in Wisconsin, Illinois, Michigan, and Iowa (Table VIII). These Ger-

TABLE VIII
Birthplace of Children in German Families for Selected Counties in Nebraska, 1870

County	German without Children	German Families with Children Born in				Total with Children
		Germany Only	Germany and Nebraska	Nebraska Only	In Other States and Canada	
Cedar	20	17	4	12	50	83
Cuming	44	36	34	45	150	265
Dodge	43	69	11	43	80	203
Hall	22	20	10	23	17	72
Madison	9	15	2	6	50	73
Platte	11	22	14	26	19	81
Stanton	9	14	2	2	30	48
Pierce	7	9	1	2	10	22
Wayne	2	2	4	1	6	11
	167	204	82	160	412	858

mans were no newcomers, but fully a part of the American westward movement and their rapid occupation of the better loess soils in Nebraska.

The Saginaw Valley

The first sizable number of Germans who farmed in Michigan followed the territorial road out of Detroit toward the Kalamazoo Valley and settled in Washtenaw County, two miles west of Ann Arbor. The opportunity to find seasonal work and a market for farm products kept another group in Macomb County close to Detroit, two miles southwest of Mount Clemens on the Clinton River.⁵¹ The first German settlement in the deep woods of Michigan was Westphalia in Clinton County in 1841. This "model of a German Catholic community"⁵² was for many years accessible only over the northernmost territorial road, the Grand River Road, which was in very poor condition. The railroad, hopefully expected in 1847, by-passed Westphalia by four miles. The clearing of the forest was found to be very difficult, but it did not deter further influx from the home villages of the first settlers. Of forty-seven families, forty-two, numbering 235 persons came from Adenau in Westphalia between 1841 and 1856. The yield of grain crops while not very reliable during the first decade was still found ample by the land-hungry settlers. Farm products brought better prices after the farmsteads were connected with the railroad by roads. A thorough investigator of German emigrants from Adenau comes to the conclusion that many who followed a trade in Germany turned to farming in Michigan later on. The first immigrants had worked on the canal near Buffalo and advised their friends to do

⁵¹ George Newman Fuller, "Economic and Social Beginnings of Michigan," *Michigan Historical Publications*, University Series I, Lansing, Michigan, 1916, 185-241; map of trans-territorial routes, p. lxxv.

⁵² Joseph Scheben, "Untersuchungen zur Methode und Technik der Deutschamerikanischen Wanderungsforschung . . .," *Inaugural-Dissertation*, Bonn, 1939, p. 126. While written from the genealogical point of view this investigation is very informative for the history of migration and settlement.

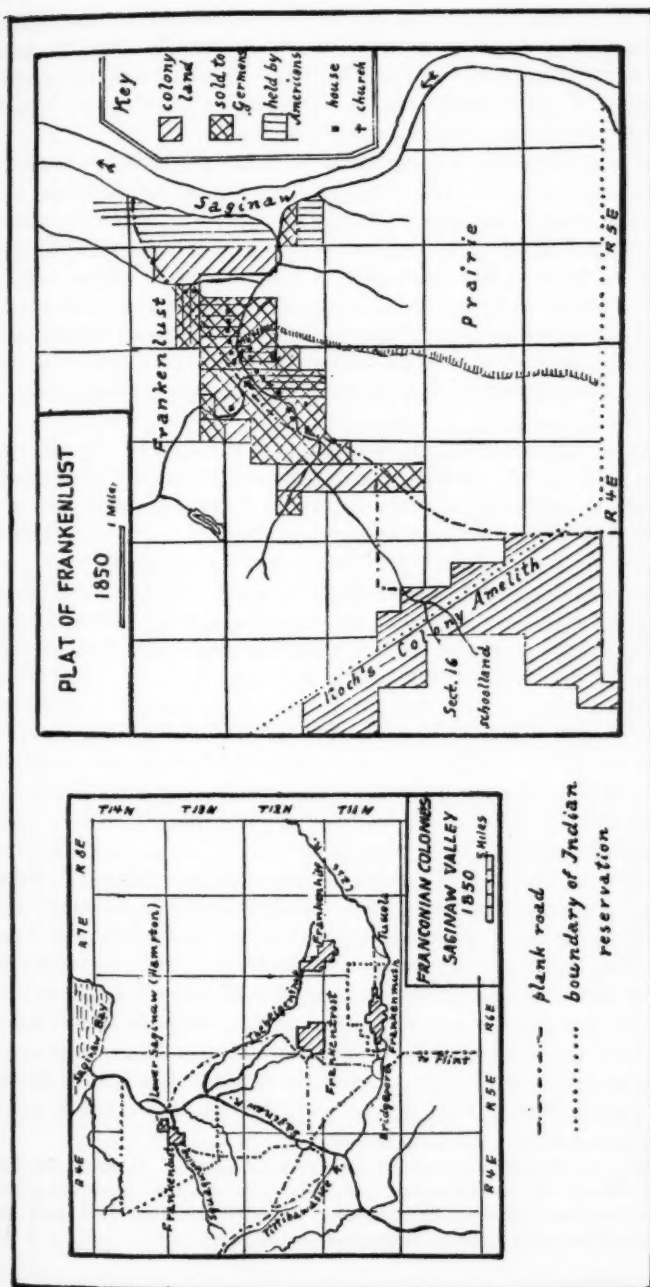


FIG. 8. The Franconian Settlements in the Saginaw Valley are shown on a contemporary German map printed in *Aus den Tagen der Väter*, Wartburg Publishing House, 1930. The Plat of Frankenlust is a simplified and Anglicized version of Dr. Koch's original map of 1850.

the same. Later on, older farms in the settlement itself provided work for the newcomers. Some of these came from other parts of Germany, but that did not affect the character of the community: Westphalia is still German, and purely Catholic; as late as 1934 all children spoke German. The staying power of the Franconian settlements in the Saginaw valley was equally strong.

The Saginaw country had the reputation of being particularly unhealthy and swampy in a generally unhealthy and swampy part of Michigan. There was no good direct road from Detroit to Saginaw Bay before 1850, only a trail. Indians and fur trappers had even said that the region was dangerous. The soil of the Saginaw country was about the same as in other parts of south central Michigan, a dry sandy loam with oak openings, rich alluvial soil in the river bottoms, and much marsh land and patches of "wet prairie." The Saginaw region was perhaps a little more accessible because of lake navigation than the Grand River country which was settled later. Still, the main factor which brought Germans to the Saginaw Valley is an historical incident.⁵³

Frankenmuth, Frankentrost, Frankenlust, and Frankenhilf, founded in that order between 1845 and 1848, have a socio-religious background.⁵⁴ A mission society in Franconia, in Nürnberg, Germany, was devoted to the so called inner mission, the improvement of social conditions at home. The society aspired to help young couples who did not have the three hundred thalers for the government marriage permit by assisting their emigration so that they could marry abroad. Reverend Löhe, who headed the project, conceived the idea of combining inner and outer mission by settling the young couples on an Indian reservation so that they could convert Indians and teach Indian children at the same time.

The German Lutheran minister in Ann Arbor was asked to look for suitable land; he bought about six hundred acres from a small Indian reservation on the right bank of Cass River, a tributary of the Saginaw, about one mile above Bridgeport (Fig. 8). Five young couples and two unmarried young men filled with a desire to found a mission parish in America settled on this land in 1845. One year later Frankenmuth consisted of about one hundred persons and had a doctor and a minister. The region was wooded and the first task was the building of a plank road to Tuscola, the county seat, and Bridgeport. Navigation was impeded by the changing water level of the Cass. It was better on the Saginaw. The next tract, also wooded, was bought seven miles north of Frankenmuth and eight miles east of Saginaw. The third site was on the Squasquaning River in Bay County and had three advantages over the first two sites: the river was navigable for small steamers and sailboats; Hampton, where employment could be found, was only four miles away; and the land was partly prairie. Again the site was on an Indian reservation. The forests were scattered with swamps, but drainage was easily accomplished

⁵³ George Newman Fuller, *op. cit.*, pp. 364, 367.

⁵⁴ The description of the Franconian settlements is based on Fr. C. L. Koch, *Die Deutschen Colonien in der Nähe des Saginaw Flusses. Ein Leitfaden für deutsche Auswanderer nach dem Staate Michigan in Nord-Amerika*. Braunschweig, Georg Westermann, 1851, and George J. Fritschel, *Aus den Tagen der Väter*, Chicago, 1930, pp. 8, 14-29.

through channels connecting the creeks. Frankenhill, the fourth tract, was also situated on a tributary of the Saginaw, the Thebening River. The price for the land varied from one dollar to two and a half dollars per acre depending on the distance from the Saginaw River. Löhe's idea to keep non-Lutherans out by buying all the land between the Cass River and the Saginaw Bay had to be given up for lack of funds, most of which had been contributed by rich philanthropists in Nürnberg.

The Franconian settlements received good publicity in Germany. The United States consul in Stuttgart featured Michigan favorably in his widely read book *Der Nordamerikanische Landwirth*, a richly illustrated and perhaps the most thorough German guide to American agriculture.⁵³ The second edition had a map of Michigan on which the counties on the Saginaw were conspicuously colored. Saginaw County paid for the printing of an extra seven thousand copies of a state immigration pamphlet in German which was circulated by the Germans of Saginaw among friends in Germany.⁵⁴ A geologist published one of the most informative descriptions of a German colony about the Franconian settlements.⁵⁴ Dr. Koch's advice on matters relating to clearing, drainage, and cultivation was practical. He urged that only unmarried persons or childless couples should emigrate so that husband and wife could hire themselves out during the first winters. Skilled workers should continue their trade for some time. Koch bought an additional tract of land southwest of Frankenhill in Kochville township. It was to be parcelled out in two- or three-acre plots "to make community life possible," and planned specifically so as to keep Anglo-Saxon speculators out and to enable small holders to increase their acreage later on. Saw mills in the vicinity provided work and cheap lumber for buliding. "Pilgrim" houses where colonists could stay in the beginning were provided in Frankenhill and Amelith, Koch's colony.

The Franconian settlements were successful chiefly for three reasons. 1) Large tracts could be acquired from funds donated for poor settlers. 2) The village pattern of settlement by a homogeneous group made possible a maximum of cooperation. Koch's advice was obviously followed: most immigrants were either unmarried or childless couples (Table IX). In four townships Buena Vista, Kochville, Blumfield, and Frankenmuth percentages of German stock ranged from sixty-seven to ninety in 1860. 3) All settlers were Lutherans; with the exception of three ministers, one doctor, and twenty persons engaged in trades in Frankenmuth, they were all farmers.⁵⁷

A smaller equally homogeneous group occupied the area around Rogers City in Presque Isle County where German-born persons represented 44.51 per cent of the total population in 1870. German carpenters who could not find work in Detroit came to work in the lumber camp in what later became Rogers City. There were no

⁵³ C. L. Fleischmann, *Der Nordamerikanische Landwirth, Ein Handbuch für Ansiedler in den Vereinigten Staaten*. Frankfurt am Main, 1848. Second Edition, Frankfurt am Main, 1852.

⁵⁴ William A. Jenks, "Michigan Immigration," *Michigan History Magazine*, XXVIII, 1944, 77.

⁵⁷ The twenty trades were: lumberman, brewer, hotelkeeper, mason, teamster, blacksmith, wagonmaker, one each; coopers, sawyers, shoemakers, three each; four carpenters.

TABLE IX
Germans in Saginaw County, Michigan, 1860

Township	Total White Population	Families*	German Born Persons	Children of German Born Parents†	German Stock	Percentage of German Stock of White Population
Birch Run	662	7	30	2	32	4.83
Blumfield	557	78	227	194	421	75.50
Brady	278	..	..	..	..	..
Brant	88	..	..	..	..	..
Bridgeport	490	11	34	22	56	11.43
Buena Vista	231	31	106	49	155	67.10
Chesaning	538	..	..	..	..	..
East Saginaw	2971	203 (6)	664	288 (14)	952	32.04
Frankenmuth	1082	184	465	504	969	89.56
Fremont	62	..	..	..	..	..
Kochville	658	90	264	207	471	71.58
Maple Grove	201	1	4	..	..	..
Saginaw	879	63 (3)	210	121 (6)	331	37.66
Saginaw City	1692	105 (4)	373	200 (7)	573	33.87
Spaulding	216	2 (1)	18	5	23	10.65
St. Charles	505	2 (1)	5	4 (6)	9	1.78
Taymouth	305	1	4	2	6	1.97
Thomastown	443	16	64	24	88	19.86
Tittabawassee	513	16	48	23	71	13.84
Zilwaukee	186	13	41	15	56	30.11
Total	12,557	823 (10)	2557	1660 (40)	4,213	33.54

* Intermarriages in ().

† Children of intermarriages in ().

Native-born children were born in Michigan, except forty-one: two in Buena Vista; three in Frankenmuth; five in Blumfield; nine in Saginaw City; twenty-two in East Saginaw.

roads, lake navigation was interrupted all winter, but earnings were good.⁵⁸ Then the hardwoods in the townships Rogers, Moltke, Belknap, Bismarck, and Posen were advertised in letters to Germany by the first settlers and in the thirty issues of a German magazine published by the commissioner of emigration for Michigan stationed in Frankfurt and Hamburg between 1870 and 1875.⁵⁹ Lumbering also provided opportunities for the sort of small business that appealed to the German immigrants. On a recently published map of the farm people in Michigan according to ethnic stock the original settlements, discussed above, are still regions of prevalent German population.⁶⁰

North Central Wisconsin

The factors which contributed to Wisconsin's large German population were

⁵⁸ *Geschichte der Evangelisch-Lutherischen St. Johannis Gemeinde in Rogers City, Michigan*. Detroit, 1923, 7-10. A contemporary expression of continued group life is the modern building of St. John's parochial school, completed in 1945.

⁵⁹ William A. Jenks, "Michigan Immigration," 85-86.

⁶⁰ J. F. Thaden, *The Farm People of Michigan According to Ethnic Stocks: 1945*. Michigan State College. Agricultural Experiment Station. East Lansing. 1945.

aply summarized in an early study as the climate, the fertility of the soil, the low price of land and its availability due to the state's peculiar disposal of land grants for schools, the liberal state constitution, and the policy of employing Germans as state commissioners of immigration.⁶¹ Last but not least, the state was reached by the westward movement at the time when German immigration to the United States became heavy. The southeastern region received most of the German settlers and several counties there have been investigated as to the distribution of different nationalities.⁶² The wooded counties in north central Wisconsin, among them Marathon and Shawano, also received a disproportionately large number of German immigrants. They developed into a second core area with German majorities in certain townships.

For some time, north central Wisconsin was by-passed by the westward movement directed to the newly opened lands in Minnesota and Nebraska. The border counties between the northern upland and central Wisconsin were "the first barrier to settlement of the land to the north."⁶³ Only after bitter experiences with undependable rainfall on marginal land in the west and after the grasshopper plagues in Nebraska and parts of Minnesota did north central Wisconsin come into its own. The whole region was densely wooded and lumbering interests rather than the urge to open more agricultural land brought people to Marathon and Shawano counties and prompted the development of the railroad from Stevens Point in Portage County to Ashland on Lake Superior. Sandy soil covered most of Portage County and reached into Marathon along the Wisconsin River. The Colby area is found in western Marathon and along its present northern boundary, light loamy soil extended over central and eastern Marathon and most of Shawano.

Selection of wooded land and light soil by German settlers was, of course, also basically influenced by the time of their arrival. American contemporaries took notice of the comparatively large number of Germans who began to farm with some success on lighter soils.⁶⁴ Their preference for wooded land was displayed in southeastern Wisconsin and the affinity between German settlers and forests could almost be used as a superficial explanation of their concentration in originally wooded areas.⁶⁵ Still, the German's love for the forest—persuasively illustrated in German

⁶¹ Kate Asaphine Everest, "How Wisconsin Came By Its Large German Element," *Collections of the State Historical Society of Wisconsin*, XII, Madison, 1892, 302-303.

⁶² Joseph Schafer, *Wisconsin Domesday Book. General Studies*, II, IV. Madison, 1927, 1937. "The Yankee and Teuton in Wisconsin," *The Wisconsin Magazine of History*, VI (1922-23), 125-145, 261-279, 386-402; VII (1923-24), 3-19, 148-171. Benjamin Horace Hibbard, *The History of Agriculture in Dane County, Wisconsin*. Bulletin of the University of Wisconsin Nr. 101. Economic and Political Science Series, vol. I, Nr. 2, Madison, Wisconsin, 1904.

⁶³ Guy-Harold Smith, "The Populating of Wisconsin," *The Geographical Review*, XVIII, No. 3 (1928), p. 415.

⁶⁴ "At this date (1866) probably one half of the light soils of Wisconsin is owned and tilled by Germans. . . . The increase of the German element is rapidly augmenting naturally and by an immense influx of immigration so that in a few years all our light lands—will be occupied and made immensely productive." From "Revolution commenced in Western farming," in *Cultivator & Country Gentleman*, XXVIII, August 1866, 138.

⁶⁵ "The Germans are seen to be massed in the eastern and north central counties, a position

song and poetry—can hardly serve as the psychological explanation of the location of migrating groups of people. First of all, not all German immigrants came from heavily forested regions. Secondly, there was a great difference between the cultivated woods in German countries during the second half of the nineteenth century and the virgin forests in Wisconsin. The frequent use of the word *Busch* for woods instead of *Wald* in German-American literature and poetry reflects the German immigrant's very experience of this difference.

The fear of wind and storms mentioned in some studies as the reason for the avoidance of open land by foreigners is rarely mentioned by German immigrants themselves; when it occurs, it is usually in connection with recommendations to plant windbreaks.⁶⁶ But numerous testimonies in literature tell of a German settling in the forests not because he loved them so much but because he had a practical reason, or because he thought he had one. A popular and fallacious reason was the belief that soil could be judged by the trees which grew on it and that good and many trees meant good soil. Native Americans sometimes judged soil by the type of trees found on it and German immigrants were advised to acquaint themselves with American species and to watch for marks on trees that would reveal high water levels along creeks, wind directions, and the effect of floating ice. A good example is *Fleischmann's* chapter on American forest trees as indicators of soil quality, written for "the German immigrant who in his former home had learned to appreciate the value of wood."⁶⁷ Many German emigrants had learned that forest should be an integral part of agricultural economy even if they shared very little of the benefits from state, community, or privately owned forests in the fatherland. The prospect of an assured wood supply and additional income from selective clearing habits was more likely to be envisaged by persons who had seen forest economy in practice. Such an attitude is not necessarily conservation-minded, but it implies the intention to stay on the same farm for many years.⁶⁸ Nor could such expectation always be realized. When there was too much wood and mills and markets were far away, as was the case in Marathon County, the finest hardwood and pine were burned or given away. Another economic consideration was that the sinking of wells was generally more expensive on level open land and that water was more

which corresponds markedly with that of the heavily-wooded districts; they have shown their preferences first for the wooded lands near the main routes of travel namely the eastern counties and from there have spread to the north central parts of the state into deeper forests." Kate Asaphine Everest, "How Wisconsin came by its Large German Element," p. 313.

⁶⁶ Mary Dopp, "Geographical Influences in the Development of Wisconsin," *Bulletin of the American Geographical Society*, XXV, 595: "Many Germans and Norwegians settled on the hilly land, perhaps because they were accustomed to it at home. Most foreigners were afraid of windstorms and avoided the open." Benjamin Hibbard, *op. cit.*; p. 110: "The German was the last to leave the shelter of the woods."

⁶⁷ C. L. Fleischmann, *op. cit.*, p. 23.

⁶⁸ "The felling of trees produced cordwood for sale, fuel for the home, brushwood for heating. . . . Most of the cordwood was sold in Madison and brought an income in money much needed and greatly appreciated." Rose Taylor, "Peter Schuster, Dane County Farmer," *Wisconsin Magazine of History*, XXVIII (1945), 287.

easily available in hilly districts. By far the most important reason was the need for wood for building, fuel, and fencing. Wooded land meant a harder and slower start, but often the only possible start for the immigrant of little means. The sale of firewood in the next town could help through the first winter. In the border counties of north central Wisconsin the lumber camp or the mill provided opportunity for additional income during the first winters.

These considerations are valid whenever a German faced the choice between wooded and open land.⁶⁹ Wooded lands in Marathon and Shawano counties had a special attraction; most of the lands which were granted to the states for school purposes had been selected in remote regions and were offered at low prices in the sixties and seventies. Public lands in Marathon County cost from fifty cents to one dollar and twenty-five cents per acre around 1870; in Shawano County, from one dollar and twenty-five cents to two dollars and twenty-five cents.⁷⁰

In 1855, one year before the Germans came as the first to take up farming permanently, there existed twenty small clearings in Marathon County, mostly unoccupied.⁷¹ The nearest land office had been transferred in 1853 from Mineral Point to Stevens Point in Portage County after Marathon had been set off from Portage in 1850. Stevens Point was a stopping place for those who planned to go farther north; consequently a number of small German business men established themselves there.⁷² A few farmers from different parts of Germany had come to Sharon township, Portage County, before 1860. For at least ten years this was the only coherent German agricultural area, developed by a group from Prussia who came in the middle sixties and worked partly at a saw mill close to the source of Waupaca River.

A sleigh road connected Stevens Point with Wausau, a mill settlement on the Wisconsin. The trail which had to be used in summer followed every bend on the high east bank of the Wisconsin River. In 1856, Marathon County authorized the first road from Wausau to the southern border toward Stevens Point. The American fur company had spread the reputation of the county as being barren, stony, sandy, mountainous and marshy, fit only for raising a little hay on river islands and bottom lands. Lumberjacks had noticed timothy and clover growing in road tracts. They started the few clearings east of Wausau which depended for all of its economic life on the four saw mills until the seventies.⁷³

⁶⁹ B. H. Hibbard, *op. cit.* p. 106, describes them as follows: "There was often a variety of considerations that resulted in a particular selection; perhaps it was a choice between having neighbours or being isolated, perhaps a choice between congenial neighbours and those with whom even conversation was almost impossible. Nearness to a highway, to a river thought to be navigable, even to places where it seemed game would be abundant turned the scale against odds which would seem of greater weight; but oftener than either or all of these the question of securing a convenient supply of wood and water was the controlling influence."

⁷⁰ Kate Asaphine Everest, *op. cit.*, p. 321.

⁷¹ Louis Marchetti, *History of Marathon County, Wisconsin*, Chicago, 1913, p. 100.

⁷² Of 321 German born persons in Portage County in 1860, 105 lived in the town of Stevens Point.

⁷³ Marchetti, *op. cit.*, pp. 66, 72, 260, 267. *Marathon County, Wisconsin*, Inventory of the County Archives of Wisconsin, No. 37, 1940, p. 15.

It is said that the expectation of finding work in the mills at Wausau and Mosinee was a factor in the selection of three thousand acres of land on the west bank of Rib River made by the agents of the "Homestead Verein" at the land office in Stevens Point. This was a society of German Catholic workers in Pittsburgh who paid one hundred and ten dollars each into a treasury for which they were to receive eighty acres of land three of which were to be outlots bordering a village where each member was to have a town lot. Marathon City was surveyed and platted in the winter of 1856 to 1857 at a point up to which the Rib River was thought to be navigable. The first group from Pittsburgh arrived in 1857, by road from Berlin in Green Lake County to Stevens Point, from there by steamboat to Mosinee, where with the help of some Indians the Germans got into canoes which took them to Marathon City. The river could be used by canoes only; a road had to be built to Mosinee; the timber could not be sold since the hardwood was too heavy to be floated down to mills. It was given to the owner of a mill in return for his services of cutting and hauling the timber away. Still, the site was advertised in Pittsburgh in an illusory fashion so that a Viennese tailor bought land located farther west in Wien township of today; he had seen Marathon City on a picture with steamboats, schoolhouse and market square and therefore believed the country to be so well settled that he had to go farther west if he wanted good pasture land to raise cattle.⁷⁴ Aside from its saw mill the main function of Marathon City for many years was to serve as a meeting place for the Catholic settlers.⁷⁵ Some went farther up the Rib River to Stettin township. Due to the decrease of emigration from the rural parts of southern Germany this Catholic German settlement did not draw many newcomers from home (Fig. 9).

German settlers in Berlin and Stettin townships exerted more drawing power. Both townships were one hundred per cent German after fifteen years. Land west of the Wisconsin close to the northern border of present day Marathon County was taken up first in 1856. By 1860 farms were started as far west as Halsey township of today, about thirty miles from Wausau, the next marketing place which was reached by foot in two or three days over poor roads through the woods. The majority of the Germans came directly from Pomerania to Wisconsin. Northeastern Germany was beginning to replace southern Germany as the source of emigration. Most families had children born in Germany and Wisconsin, not in other states. That they came directly to the wilderness of the north central counties cannot be concluded from this circumstance.⁷⁶ They may have spent some time in southern Wisconsin. A few among the very first settlers lived near Madison before they came to Marathon County. Here they worked first in the mills. A well-to-do Ger-

⁷⁴ Marchetti, *op. cit.*, p. 550.

⁷⁵ Of 174 persons in Marathon township in 1860, 122 were of German stock.

⁷⁶ Schafer concludes that children born in Germany and Wisconsin only mean direct immigration from Germany to Ozaukee County, *Prairie and Forest*, p. 85. Even in southeastern Wisconsin previous residence in Milwaukee is not out of the question. Of 253 native born children of German parents in Marathon County outside of Wausau City in 1860 only 38 were not born in Wisconsin.

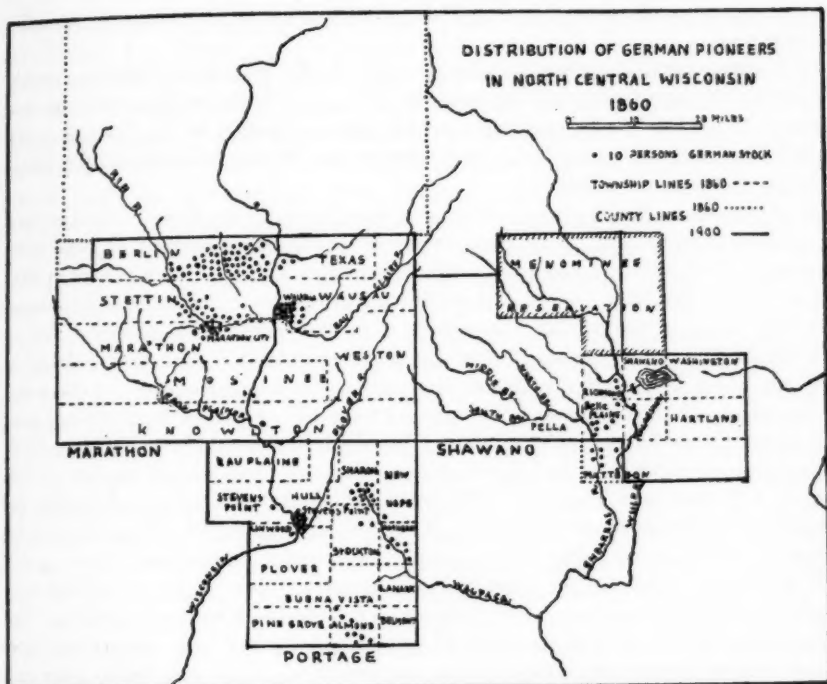


FIG. 9. Township boundaries, greatly changed since 1860, according to *Atlas of the State of Wisconsin*, ed. by H. E. F. Walling, Boston, 1876. *Inventory of County Archives*, Nos. 37, 58, notes in published census volumes 1860 through 1900, and *Wisconsin Gazetteer*, Madison, 1853.

man mill owner of Wausau brought over a whole group of Pomeranians in 1867 for that purpose. Later they went to Stettin and Berlin townships. The latter was far ahead of any other township with respect to the amount of cleared land twenty years after settlement began.⁷⁷

By that time timber from saved stands could be sold to the railroads. The Wisconsin Valley railroad did not run from Stevens Point to Wausau as had been expected, but turned off in a northwesterly direction to Junction Point, skirted Marathon along its western boundary, and reached Ashland in 1877. The railroad company had for sale the alternate sections over twenty miles on both sides of the road. Much of this land was bought by Germans at one dollar and twenty-five cents per acre. It was widely advertised in Germany by agents of the Wisconsin railroad company. The mill at Black Creek Falls, now Athens, was built by Germans who had been brought here from Grafton, Ozaukee County, by the agent of a Milwaukee firm which had fifty thousand acres of railroad land for sale in western Marathon. After Halsey, Johnson, and Rietbrock townships were well populated, the Germans

⁷⁷ Marchetti, *op. cit.*, pp. 269, 542.

began to buy partly cleared land in Hall township close to the railroad from native Americans.

Northwestern Marathon became a region solidly settled by Germans, mostly from northeastern Germany. Its atmosphere is even reflected in the manuscript census of 1870 where no German name or state was misspelled by the German census taker, but occupations were: he wrote brewer for brewer, blackschildt for blacksmith, and backer for baker.

Penetration into Shawano County proceeded along Wulf River. The Germans expanded directly from their older settlements north and northwest of Lake Winnebago, which had attracted many German farmers. The first mill was built in 1843 southwest of Shawano Lake and agricultural settlement was deliberately discouraged by the owner of the mill at Shawano.⁷⁸ The first Germans in Shawano County worked at this mill. Transportation was much better than in Marathon. The Wulf River, which is connected with the Mississippi, was navigable as far as Shawano. A government road connected Shawano with Oskosh to the south; a military road ran from Green Bay to Lake Superior. Settlement in general kept close to the Wulf River, but had to halt at the Menomonee reservation. Only a small number of Germans had come to Shawano by 1860 when agricultural settlement was already established in northwestern Marathon. Very few were farmers.⁷⁹ Most of these located in Matteson township, which was part of Shawano at that time. Some settled close to Belle Plaine in the woods above Embarras River. Aside from these only four families lived on farms close to Shawano City and in Richmond township. The townships farther west of the Wulf River received the first large numbers of German settlers during the sixties. Grant was two thirds, Pella, one hundred per cent German, in 1870. Older settlers deliberately solicited immigrants from the fatherland, and a German agent of the Hamburg-American Packet Company recruited more in Pomerania and Mecklenburg.⁸⁰ The promotion of lands by the Chicago and Northwestern Railroad, particularly in Fairbanks township which was diagonally crossed by it, brought German settlement to the western border of Shawano County in the eighties.⁸¹ The orientation of earliest German settlement along the Wulf and Embarras rivers in Shawano County and the Wisconsin and Rib rivers in Marathon County had a lasting effect: South central Shawano and northwestern Marathon were never joined into a coherent predominantly German region.

⁷⁸ *Shawano County*. Inventory of the County Archives of Wisconsin. Number 58. Madison, 1942, p. 2.

⁷⁹ Seventeen German families lived in Matteson township in 1860; 14, in Belle Plaine township. In all of Shawano County there were 41 German families, 158 German born, 50 children of German parents, 10 children of one German parent.

⁸⁰ In 1870, two families were German of 46 in Angelica township, 50, of 110, in Belle Plaine; 37, of 44 in Grant; 96, of 108, in Hartland; none of ten in Kishma; all of 61 in Pella; 45 of 110, in Richmond; 19, of 64, in Shawano; 16, of 17, in Washington; 8, of 72, in Waukesha.

⁸¹ Kate Everest Levi, "Geographical Origin of Germans in Wisconsin," *Collections of the State Historical Society of Wisconsin*, XIV (1898), 357-358. See map in "Notes on the Distribution of the German born in Wisconsin in 1905" by Guy-Harold Smith, *The Wisconsin Magazine of History*, XIII (1929-1930), 107-120.

It is not possible in the scope of this paper to deal with all German settlements in the midwest many of which are not reflected in Figures 1 and 2 since their small numerical sizes do not sufficiently affect the proportion of German population in counties. While Germans lived in all but a few counties in 1870 and appear rather evenly spread over large areas a more spottily distribution is revealed when smaller political units are considered.⁸² Areas of solid German settlement frequently originated with a group or a colonization project. They are less recognizable in older states unless of comparatively recent date. An illustration is the German Catholic township of Ferdinand in Dubois County, Indiana, in 1840. A Croatian priest selected the location in primeval forests on both sides of the newly established road from Troy on the Ohio to Jasper because he was struck with the beauty of the countryside. The soil was poor. Still, due to the excellent promotion of the settlement in German Catholic newspapers all the land acquired by Father Kundek was sold to settlers by 1850.⁸³ The success of this and other Catholic colonization projects rested in strong spiritual and practical leadership rather than in a particularly favorable environment. On the whole German Catholic immigration was more urban during the second half of the nineteenth century than German Protestant immigration and was to a greater degree absorbed by American cities. Also, German Catholics were more on the defensive and lived in closely knit rural communities which occupied smaller sections intensively rather than scattered over wide areas.⁸⁴ Stearns County, Minnesota, (see Fig. 1) is an exceptionally extensive region of German Catholic rural settlement.

The metropolitan counties where more than half of the German population lived in 1900 are set off on the maps. Stratification of foreign born within large cities and their varied distribution in different wards is a sociological rather than a geographical problem.

SUMMARY

The distribution of the German-American population in the midwest during the second half of the nineteenth century is due to a colorful variety of incidents when settlements are investigated in detail. Unique historical factors are involved when, for example, the Missouri bottom lands attracted many Germans because Duden wrote a colorful book about the region, when the tale of a beautiful prairie brought a group originally destined for Missouri to southeastern Illinois instead, when a minister in search of land on an Indian reservation employs the services of a friend in

⁸² German born persons were listed in 804 out of 831 inhabited counties in 1870; in 1023 out of 1025 counties in 1900.

⁸³ Albert Kleber, *Ferdinand, Indiana, 1840-1940*. St. Meinrad, Indiana, 1940, pp. 20-23, with plat map of township and original town plan of Ferdinand. Very informative studies of Dubois, Posey and Lake counties in Indiana, with partial reprints of census lists in 1850 are by Elfrieda Lang in *Indiana Magazine of History*, XLI (June, September, December, 1945); XLII (March, June, September, 1946); XLIV (September, 1948).

⁸⁴ The author is indebted for much information to Dr. F. P. Kenkel, Director of the Catholic Central Verein of America, founded in 1855 in St. Louis. The research library of the *Central Bureau* has many early parish histories. The *Social Justice Review* published monthly since 1907 devotes two to three pages in almost every issue to "Historical Studies and Notes," many of them dealing with German settlements.

Ann Arbor, Michigan, or when agents of the German land society of Chicago meet a French trader in the Minnesota Valley who tells them of the site where New Ulm was founded.

Still, some trends are discernible in the pattern of distribution and settlement. Whether these are specifically German or characteristic of other non-English immigrants can not be determined as long as comparative studies of the reaction of different nationalities to the environment in this country are completely lacking. However, several conclusions can be stated. 1) Germans made several attempts to perpetrate the European pattern of village settlement on American soil. The villages in Perry County, the Franconian settlements, New Ulm, Grand Island, Marathon City—all were planned as villages where a farming population was to live together. 2) Germans settled in several instances directly on the frontier, on unsurveyed land in Brown County, Minnesota, in forest wilderness in Wisconsin and Michigan, as squatters in Nebraska. While they were not among the trappers and traders, they were the first to swing the axe and to break the sod. 3) Germans lacked any consistent fear of Indians. They not only settled close to but even on Indian reservations. How far the prevailing literary mood of romanticism in Germany which was generally sympathetic to natural man and in some instances even glorified the noble and betrayed Indian, is responsible for the Germans' attitude in America is an interesting speculation. German settlers of the eighteenth century felt differently. In Minnesota the Germans paid heavily for their trust during the Sioux War of 1862 when New Ulm was burned. In Hall County, Nebraska, they had expert leadership and therefore knew how to deal with Indian threats. In Wisconsin and Michigan, Indians were generally friendly. 4) German colonization societies were founded in American cities by people who were disillusioned by life in American cities. Herman was founded by a society formed in Philadelphia, New Ulm by one from Chicago, Grand Island by one from Davenport, Marathon City by one from Pittsburgh, Guttenberg by one from Cincinnati. 5) Group coherence was very strong. Settlements which were homogeneous with respect to religious faith or common local origin were able to draw reinforcements. Catholic and Lutheran churches aided as much in the consolidation of scattered German farmsteads into German townships as did immigrant letters circulated in the home villages. The staying power of rural settlements is linked to a strong parish and a parochial school or to common provincial origin but not to national German background in general. 6) Pioneers often envisaged large settlements in the future, expected to increase their own holdings, and to have friends and descendants settle around them. Accordingly they located in thinly populated districts with ample vacant land. 7) Germans who became farmers in this country had not always been peasants in Germany nor did they start to farm immediately after arrival. Only a few had enough capital to buy land right away like the well-to-do Latin farmers or groups such as the Old Lutherans and the Franconians who had common funds.

The mass of German immigrants like everybody else had first to think of earning a living. They worked on canals and on farms, in cities and in mills. They followed

certain routes along rivers, canals and roads. This was a function of the time of their arrival. Later groups settled along railroads.

A function of time was also the quality and location of land available when they were ready to start farming. Whether they bought eighty, one hundred, one hundred and sixty acres or more depended on their purses and the price of the land. Germans took out larger sections in Nebraska than Wisconsin. Others did the same. They were subject like others to geographical beliefs: Fear of fever led to avoidance of bottom land in Illinois and in parts of Missouri; in Wisconsin and Michigan they wanted sites on navigable streams; in Nebraska they needed the timber found along the creeks. Wooded land was taken for economic reasons. They responded to the advertisement of newly opened lands.

THE AMERICAN AGRICULTURAL FAIR: TIME AND PLACE

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A companion paper¹ appearing in the December, 1949, issue of the *Annals* outlined the three major geographical aspects of fairs as pattern or form, time, and place. It was therefore deemed proper procedure for the two studies to delineate the changing pattern of the American agricultural fair and then to examine the institution in the light of its time and space relations.

The first paper developed the theme that since its inception in 1810, the evolution of the pattern has been in keeping with the fair's enlarging functions. The first American agricultural fairs were educational in purpose and practice. Gradually the element of entertainment, in the form of horse racing and carnival, joined education as an integral part of the fair complex. Education and entertainment are expressed materially as halls, stables, race track, pens, and midway. There is a marked contrast in the visible pattern between the long off-season and the brief flowering of fair week.

It is the primary object of the present study to trace chronologically the diffusion of the fair from its point of origin and to measure its sectional reception. Five maps ranging from 1820 to 1949 present the time-place facts. Explanations gleaned from many sources in part clarify the map data. Of secondary importance is consideration of extra-continental diffusion, seasonal manifestations, and the localization of the fair.

THE DATA

The facts as to the time and place of occurrence of individual fairs from 1810 to the present are probably in large part recoverable. However, they are so scattered through such a variety of records as to be practically unavailable. As a result, annual summaries up to 1895 have had to be restricted to those years for which some kind of contemporary accounting was made: 1820, 1858, and 1867. For the subsequent period, 1911 and 1949 were used, for reasons to be made clear presently. The time spacing of the successive maps is obviously irregular, but the specific dates possess more merit than the haphazard manner of their selection would suggest.

By 1820 the Berkshire Plan fairs of Elkanah Watson were well established and beginning to spread outside their original nucleus, western New England and the Hudson Valley. In support of 1858 as a representative year, it may be pointed out that it came before the Civil War and within the "golden age" of the American agricultural fair, 1850 to 1870. The next year for which there are adequate data, 1867, also falls within the golden age and is expressive of the effects of the war.

¹ "The American Agricultural Fair: The Pattern."

Since about 1895 annual data on the place and time of fairs are reasonably complete.² The initial reason for selecting 1912 is that for that year George K. Holmes of the U. S. Department of Agriculture compiled a list of all known fairs,³ the only such publication issued by any government bureau since 1867. Additionally, 1912 was a reasonably normal year prior to World War I, and falls in the early stages of the technical revolution of the twentieth century. To bring the study up to date, 1949 comes after two world wars during a comparatively settled period, and at a time when industrialization and urbanization have reached a new level. It should be responsive to current trends as to number and distribution of American agricultural fairs.

In comparing the maps for the five selected years, it should be kept in mind that the number of fairs fluctuates from year to year in accordance with competition for interest, the economic well-being of agriculture, and the extent of government aid. Therefore, specific differences between two successive maps may not represent long-time trends, and hasty conclusions with respect to general tendencies may not be valid.

1820

The first peak in the number of county agricultural societies, parent bodies of fairs, came about 1820. The late 1820's witnessed a temporary decline almost to extinction, so that this early climax is important as outlining the first nucleus and beginnings of diffusion. The map symbols show the data to be highly uncertain. It is believed that numbers by states are substantially correct, but in part the localization can be only approximate. Further, the dots and circles represent societies rather than fairs. The notion that most societies held fairs is supported by contemporary statements to that effect and by specific references to a number of individual fairs. The principal sources of information for this period are the two books of Elkanah Watson,⁴ father of the Berkshire Plan fair and ardent disciple of its spread.

The 1820 map shows the known or presumed location of the 114 agricultural societies recorded for that period. Of the 114, all but 16 are in New England and New York. Of this modest remainder, a half are scattered through the seaboard states from Philadelphia to Charleston. Eight are west of the mountains, six of them in Ohio. The great concentration of agricultural societies for 1820 centers on Pittsfield, Massachusetts, where the first Berkshire Plan fair was held in 1810.

The eight societies scattered in the seaboard states south of New York, despite the intimation of Watson, can be ascribed only in part to a spread of the Berkshire

² A number of trade journals have published annual listings of fairs in order that race-horse owners and carnival proprietors might plan their season's activities. Chief among those currently available are *The Billboard*, appearing weekly in Cincinnati, and *Huff's National Fair Directory*, Bellefontaine, Ohio.

³ Bulletin 102, Bureau of Statistics, (Washington, 1913).

⁴ *History of Agricultural Societies on the Modern Berkshire System*, (Albany, 1820); *Men and Times of the Revolution*; or, *Memoirs of Elkanah Watson*, (New York, 1856).

Plan, since the Philadelphia, District of Columbia, and Charleston fairs long antedated the first held in Pittsfield.

The societies west of the mountains can be accepted as stemming from the eastern Berkshire Plan fairs. Watson reveals the mode of their establishment in the Old Northwest when he mentions the spread of the Berkshire Plan to Hartford, Connecticut, thence in the hands of emigrants to various counties in Ohio.⁵

Many of the early societies perished forever; others revived with better financial times. As Bidwell and Falconer⁶ point out, the tendency of Americans to organize on every and all occasions caused societies to spread far ahead of practical need, so that they were not strong enough to survive any kind of depression. However, the distribution of societies for this initial period shows clearly that they were the product of the New England-New York area and that they spread more easily to settlements of New Englanders west of the mountains than to closer but culturally somewhat alien Pennsylvania and New Jersey.

1858

The 1858 data are a marked improvement over those for 1820. The chief source was the Report of the Commissioner of Patents for 1858.⁷ In the report are listed the boards and societies connected wholly or in part with agriculture, for all states and territories. Some organizations so listed were eliminated when for any reason it appeared that they could not have conducted a standard agricultural fair. The balance, 894, is probably a close measure of the number of fairs held in 1858.

Plotting the data offered some difficulties, as the map symbols indicate. While the number of organizations for each state and territory is given in the Commissioner's report, they are individually localized only in part. For instance, six of the ten listed for Connecticut are specifically located within the state, twenty-seven of the seventy-six used for Indiana, and forty out of the eighty-eight for Illinois. The unassigned remainder were not plotted on the map at random, but rather were allocated to localities known to have had either societies prior to 1858, a long and unbroken record of annual fairs, or at least an agricultural population at the time under consideration. The probable error thus introduced can in no way alter the relative position of state or section with respect to number of societies and fairs.

The map reveals a marked concentration of societies in the Midwest and adjacent Border South. The parent area, New England-New York, remains strong. There has been a generous spread into the Mid-Atlantic states since 1820, but there is still a marked gap between seaboard and the trans-Appalachian Ohio Valley. From the western periphery of the Midwest in Kansas and Nebraska, a stepping stone in Utah leads to a tenuous line of societies along the Pacific coast. The Deep South, particularly the outer coastal plain, is poorly represented. Census figures for 1860 reveal that the South with 35.4 per cent of the nation's population had but 18 per

⁵ *Men and Times*, p. 400.

⁶ *History of Agriculture in the Northern United States 1620-1860*, (Washington, 1925), p. 190.

⁷ Vol. 4, *Agriculture*, (Washington, 1859), pp. 91-213.

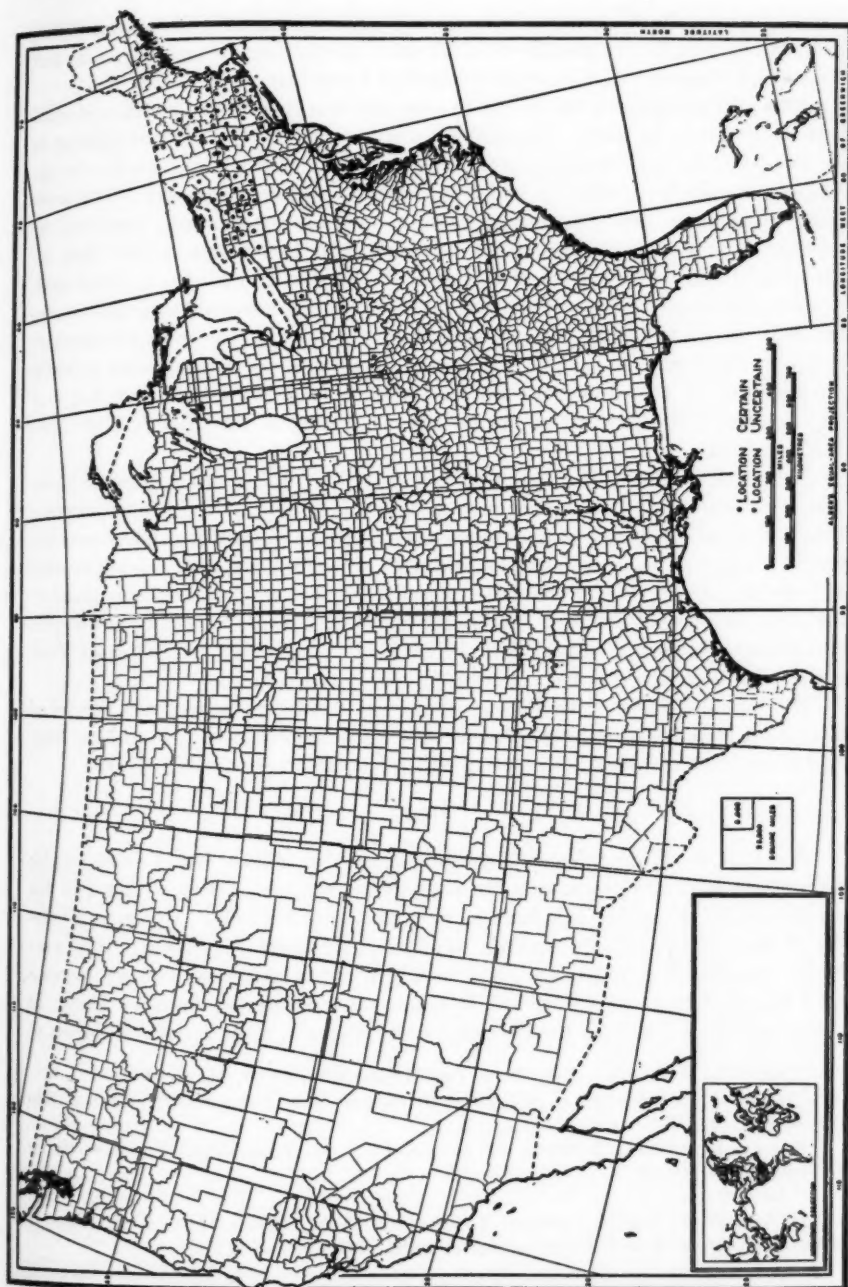


FIG. 1. Agricultural societies in 1820.

cent of the agricultural societies. Comparable figures for the Old Northwest (Ohio, Ind., Mich., and Wisc.) are 22 and 33.7, and for combined Iowa, Minnesota, and Missouri, 6.4 per cent of the population and 14.8 per cent of the societies.⁸

After difficult times in the 1830's, the fair was reaching toward a climax of numbers and influence in 1858. The fifties had witnessed its thorough establishment in the Midwest and widespread if not intensive introduction into the South. In the Midwest the seeds of diffusion had fallen on the most fertile ground. The conditions favorable to their propagation were a productive agriculture, conducted by proprietor farmers, in a cultural milieu receptive to New England-New York influences. In the border states of Kentucky, Tennessee, and Missouri, where stock rearing was important and remunerative, agricultural societies and their accompanying fairs spread readily.⁹ New England and Midwestern influences are apparent in the societies and fairs of the Far West. The failure of Pennsylvania to attain the preëminence in numbers that it held later, may perhaps have been due to a lingering cultural resistance to institutions originating in the New England-New York nucleus.

The Deep South, with an old tradition of agricultural societies in South Carolina, somehow failed to provide the conditions favorable to their rapid increase. Francis¹⁰ quotes DeBow's contemporary account to the effect that planters were not partial to agricultural societies among themselves, hence there were few in the areas of large plantations. Gray¹¹ is more explicit, pointing out that well-to-do planters, even though engaged in varied activities, organized agricultural societies with great enthusiasm. However, after each individual had thoroughly aired his views, there remained little of interest and the societies ceased to exist.

It seems conclusive from the distribution in 1858 that society and fair found their most favorable reception among independent farmers, amenable to New England-New York influences, and living in a productive agricultural section.

1867

For 1867 the United States Commissioner of Agriculture issued an exhaustive report¹² on agricultural societies throughout the nation. The total listed in the report is 1,367, a considerable increase over the figure for 1858. However, a number of the societies did not conduct standard agricultural fairs because they were highly specialized or too small. Subtracting the non-qualifying societies leaves a total of only 489, as compared with 894 on a far-less selective basis for 1858. In many individual instances the deviation from normal size or activity is known to

⁸ Wayne C. Neely, *The Agricultural Fair*, (New York, 1935), pp. 83-84.

⁹ Lewis C. Gray, *History of Agriculture in the Southern United States to 1860*, (Washington, 1933), p. 785.

¹⁰ David R. Francis, "Southern Agricultural Fairs and Expositions," *The South in the Building of the Nation*, V (1909): 588-589.

¹¹ *Loc. cit.*

¹² "Agricultural and Horticultural Societies and Clubs", *Report of the Commissioner of Agriculture for the Year 1867*, (Washington, 1868): 364-403.

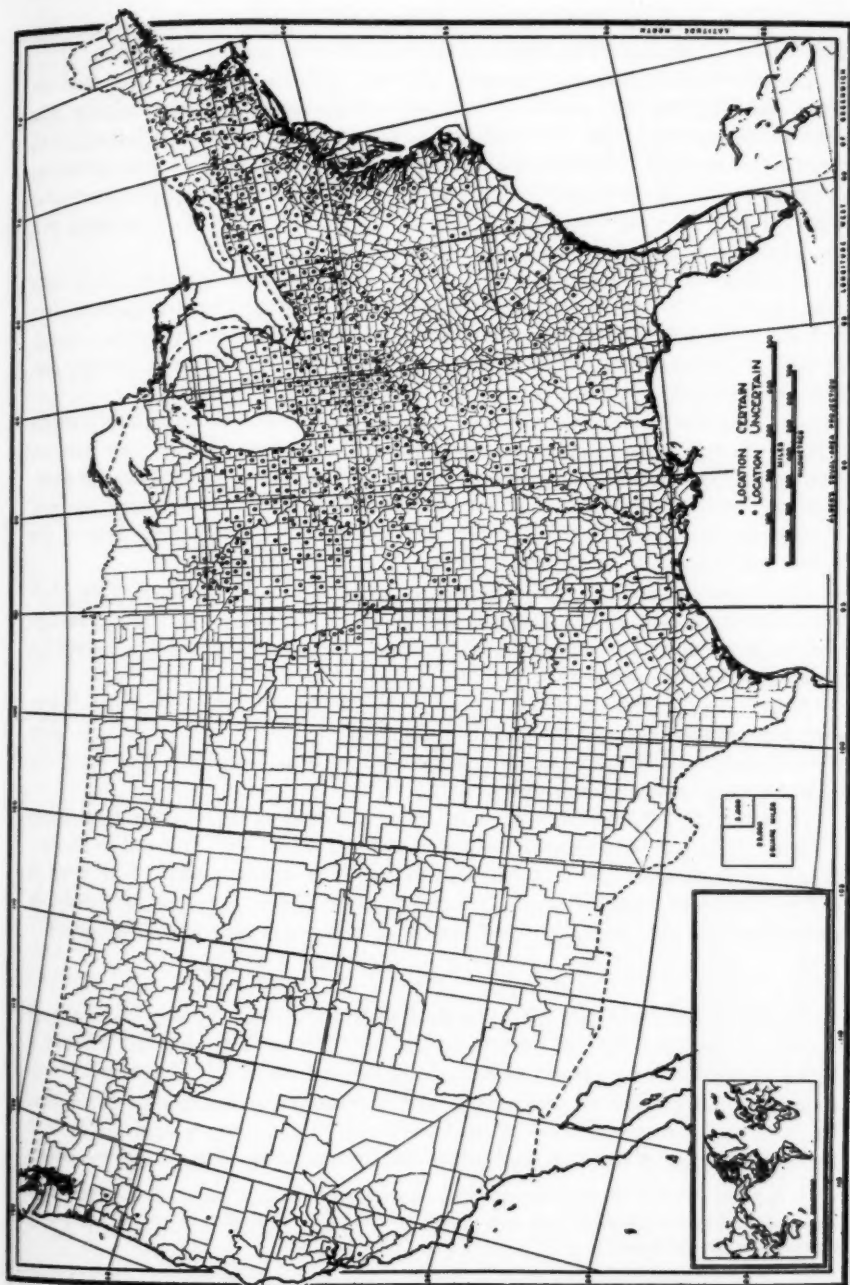


FIG. 2. Agricultural societies in 1858.

have been temporary, with a return to the previous standard in later years. For this reason a quantitative comparison between the two years is misleading.

Another evident difference between 1858 and 1867 is genuine. While both lie within the 1850-to-1870 period of maximum importance of the agricultural fair, 1867 comes hard upon the close of the Civil War and still reflects the destruction of that titanic struggle. While some northern fairs were forced to suspend operations during the war, in the South the cessation of such activities was almost complete. The revival of fairs after the close of the war in 1865 was naturally more rapid in a victorious than in the defeated section of the nation.

Examination of the map for 1867 shows New England and New York little changed from 1858. The loss in the Middle Atlantic states is more apparent than real, since the deficiency would be restored if all the smaller societies were counted. Notable is the fact that the gap in mountainous central Pennsylvania between seaboard and Ohio Valley has not yet been closed.

The Midwest remains the stronghold of the fair. Some lessening in the center reflects the small size of many societies rather than a reduction of their number. Decline on the western periphery, noticeable in Nebraska, probably means over-expansion in 1858 and lack of economic strength sufficient to withstand the war, as only one society from the earlier date survived in 1867. Numerical losses in the border states are real casualties of the war's destruction.

Particularly striking in the Far West is the string of societies marking the Mormon settlements along the mountain front. On the Pacific coast the percentage loss is tremendous, but the reduction in numbers is slight and may well represent the vagaries of a particular year.

In the Deep South the losses were so great as to threaten extinction. Never very strong, the fair was an early victim of the war. Its restoration was slow where economic destitution was the rule and there was frequently little sympathy between the government and the farmers.

In summary, 1867 reveals tendencies much the same as those shown by the map of 1858. The fair is thoroughly rooted in the Northeast and Midwest, with continued involvement of the Mid-Atlantic states. The underpopulated Far West is still in a pioneer stage of flux. The South, not highly receptive previously, is strengthened in that trend by the disasters of a lost war and an uneasy peace.

1912

For 1912, Holmes¹³ lists 1,702 standard agricultural fairs, in addition to a large number of specialty fairs of various kinds. By this period fairs had attained a degree of stability with respect to both character and identity. The form reflected a complete integration of educational and entertainment functions. Since then the pattern of permanent installations has changed little, even though 1912 fell in the initial stages of the mechanization and urbanization dominating twentieth-

¹³ *Loc. cit.* This is the most recent official government census of fairs. It is preferable to trade publications for the same date as a source of data, since it gives a variety of information not contained in the latter.

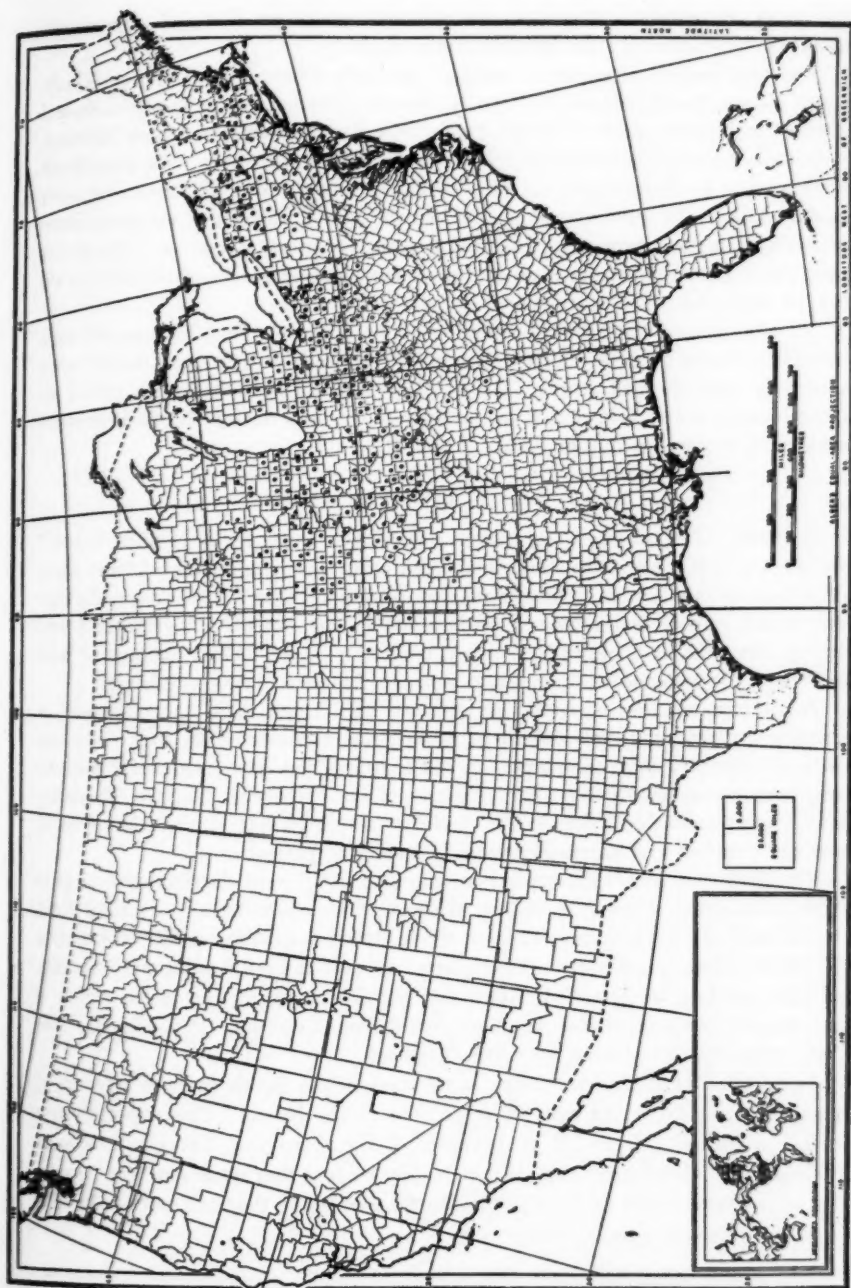


FIG. 3. Agricultural societies in 1867.

century developments. State fairs had selected permanent sites and economic depressions had eliminated the weaker county fairs.

The map reveals strength in numbers precisely where it had been previously, namely, in the Northeast and Midwest, with solid participation by Pennsylvania and other Mid-Atlantic states. Of the contiguous Border South, northern Missouri, central Kentucky, and central Tennessee are strongly represented. The Deep South is restored to its modest position of pre-war days, with fairs still few in the outer coastal plain. The agricultural sections of the Great Plains and mountain states are outlined, a good showing considering the small relative population. The Pacific coast has a low density; the inclusion of various specialty fairs would lift it to the level of Nebraska and the Dakotas.

To summarize for the period centering on 1912, the standard fair was still most numerous where relatively small farmers working their own land carried on a substantial general agriculture. The great strength of the fair for this period lay in the Northeast and Midwest, with inclusion of the intervening Mid-Atlantic states and extension into the Border South.

1949

In 1949, 1,749 standard agricultural fairs were held in the United States.¹⁴ Inclusion of poultry and livestock shows and other specialty fairs would add about a thousand to this figure. There is no reason to doubt that 1949 measures the current health, vigor, and sectional prominence of the American agricultural fair. During the year agriculture was prosperous and governmental support of fairs generous. Attendance was good and average financial status satisfactory.

In the combination of track, grandstand, barns, and halls, the off-season or permanent pattern of 1949 differs in no prominent respect from that of the late nineteenth-century fair. Evidences of the technical age come principally with the temporary accessions of fair week: displays of farm machinery, automobile racing on the track, mechanical rides on the midway, trailer clusters of those living on or near the grounds, and diurnally changing masses of parked cars.

The 1949 map shows general agreement with the plan of distribution evident in 1858. The great strength is in the Midwest, with about half the national total. On the basis of high frequency of fairs, the Midwest has expanded from the nucleus of 1858 to include much of the old periphery, not only eastern Kansas and Nebraska, but also portions of Missouri, Kentucky, and Tennessee. The prime region of fairs extends without serious break eastward from Ohio into Pennsylvania, New York, northern New Jersey, and New England.

In addition to the border states, some areas of the South show an intensity of fairs comparing favorably with many sections of the North. This is notably true outside a littoral belt in all or portions of the Carolinas, Georgia, Louisiana, Arkansas, and Oklahoma. While it is readily evident that these southern fairs belong to the same genus as those in the North, specifically they are much reduced in

¹⁴ *The Billboard*, (July 9, 1949), 71-82.

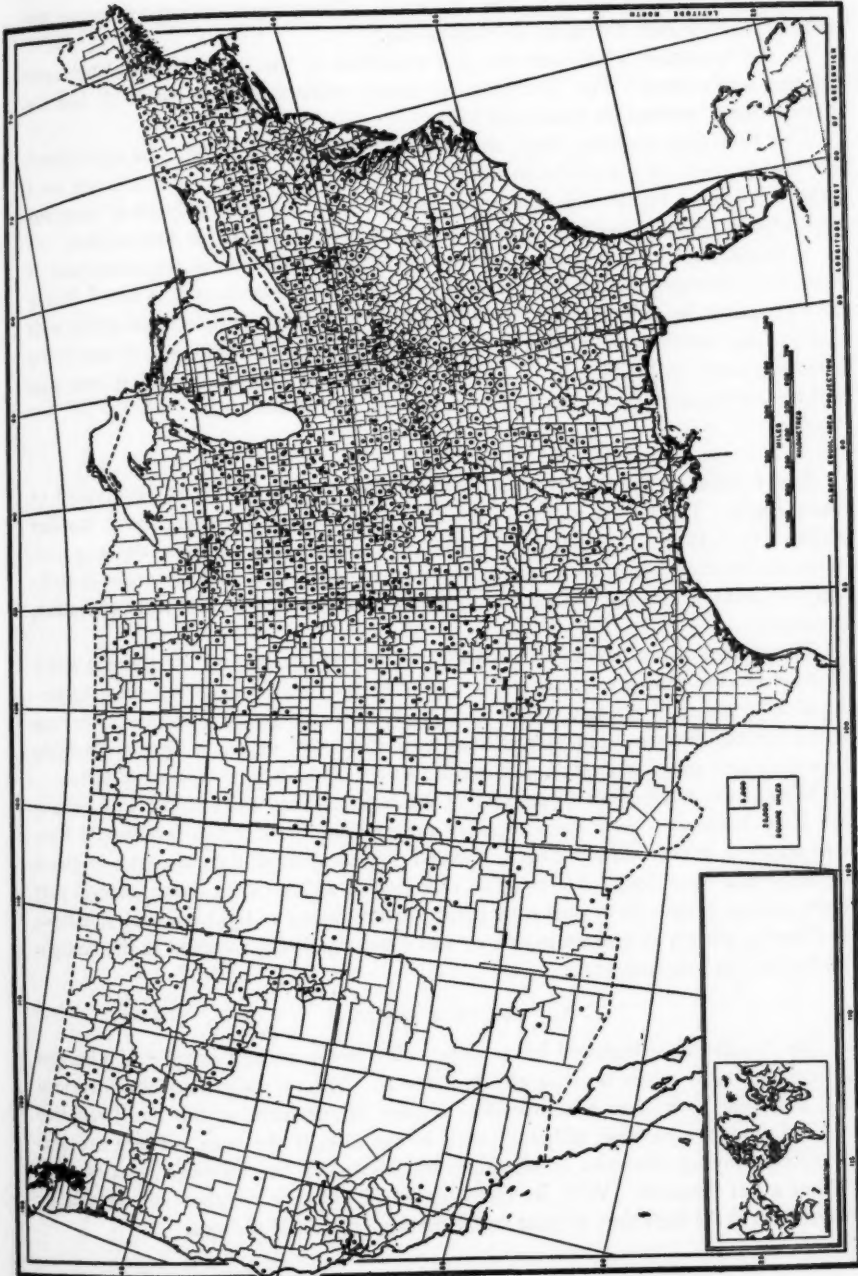


FIG. 4. Fairs in 1912.

range of activities, attendance, and influence. Comparison of importance on the basis of density may therefore be misleading.

In the mountain West fairs are still restricted to the sparse and isolated agricultural settlements. The Pacific coast shows more fairs than in 1912, but the distributional pattern is much the same.

The 1949 map confirms, then, what has been long apparent, that the agricultural fair thrives best in the Midwest, where social and economic conditions are such as to favor most highly this product of the Northeast. The Midwest of fairs has expanded to include peripheral areas not commonly included in that section.

It seems likely that as long as the agricultural fair remains an important part of American folkways, its relative distribution will remain much as it is now. While fairs appear to be quite healthy in 1949, and their number compares favorably with that for any previous year, it is obvious that they have not increased to match the general growth of population. On this basis the peak age of the fair is long past and its comparative decline can be forecast with assurance.

DIFFUSION OUTSIDE THE UNITED STATES

Every phase of the American agricultural fair has its Old World equivalent or counterpart. There is a modern English agricultural fair having many familiar traits. Nevertheless, the American fair, with its pattern of halls, sheds, grandstand, and track—not to mention the evanescent midway and sulky races—is strikingly uniform within the United States and readily distinguishable from any other, anywhere.

The spread of the American fair to Canada is not surprising, for there is ample precedent in the diffusion of many other culture traits northward. The varying sectional importance of the fair in Canada closely matches that of contiguous portions of the United States. The fair thrives in a strip that begins with the Maritime Provinces and extends westward through Quebec and Ontario into the prairies.

More unexpected is the appearance of the American agricultural fair in Australia and New Zealand. Why the American rather than the English fair should have been adopted, is not entirely clear. There is no question of the American origin of the Australia-New Zealand fair. The inclusion of sulky racing as an integral part of the pattern is enough to prove the point, for the racing of light harness, standard-bred horses, purely American in origin, was enthusiastically accepted in the Antipodes but not in England.

THE FAIR SEASON

The American agricultural fair is closely akin to the ancient practice of a harvest festival, so that it comes traditionally in autumn. The very nature of the American fair, stressing as it does a competitive display of products of the farm, requires that it follow the harvest, although such is not always the case. There are also the accompanying elements of respite from labor and the welcome coolness that follows a hot summer. With its combination of pleasant weather and temporary leisure, fall is the best time of year for attracting crowds of visitors.

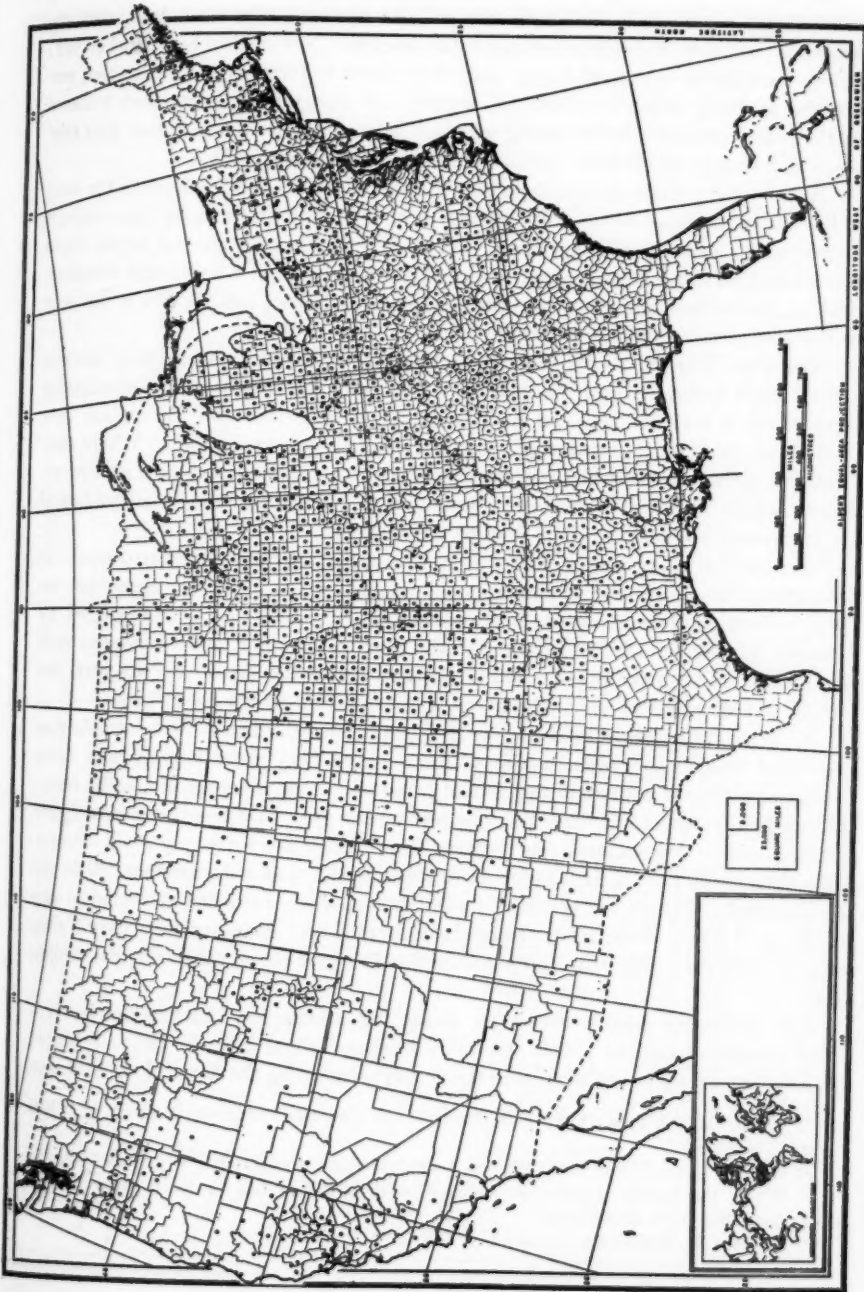


FIG. 5. Fairs in 1949.

So deeply ingrained is the association of fairs with fall, that most Americans are unaware that they ever come at any other season. Yet obviously a market fair, unless its trade is restricted to an immediate plant harvest, is not so limited, nor are the specialty fairs for livestock, poultry, or citrus fruit. American colonial market fairs commonly had a spring session,¹⁵ while most Peruvian Indian fairs take place at a change of seasons, which offers several possibilities.¹⁶

A fair having dates set nearly a year ahead cannot precisely anticipate the time of harvest, nor can all fairs within a given section be held on the same days without engendering destructive competition. Nevertheless, for each general region there is a recognized fair season, which comes progressively later in a southward direction. That is, the earliest fairs are held near the Canadian border and the last of the year in the southernmost tier of states.

The map (Fig. 6) shows the range of dates for American agricultural fairs in 1949. Each individual fair was allotted a number in accordance with the calendar week when it was held. Then each state was summarized and the median date plotted on the map.¹⁷ From these data the isochrones were drawn. Where they exist, fair circuits were a chief criterion in guiding the selection of specific isochrones. Since circuits represent a regional community of interest in fairs, it seems logical for isochrones to include rather than to divide them.

Fair circuits are groups of fairs within a restricted area joined to avoid excessive competition for educational exhibits and amusement features by agreement on dates. Such agreement among sectional groups of fairs was first suggested by Elkanah Watson in 1820.¹⁸ However, the practice was not well established until the 1880's. The make-up of circuits changes somewhat from year to year, but hardly to the extent of seriously affecting the position of the isochrones.

All accurately known circuits for 1949 appear on the map. It is notable that organized circuits are restricted to sections where fairs are numerous and horse racing a prominent feature of the annual program. The presence of circuits introduces a local range of fair dates not apparent on the map, based on the median figure for each state. For example, in Indiana, where there are three important circuits, sixty-three fairs have a time range of thirteen weeks, and only fourteen fall in the median week. By way of contrast, in Oklahoma, where fairs are restricted in size and local in scope, there are no recognized circuits, and sixty-one fairs have a time range of only six weeks, with thirty-five of the sixty-one occurring during the median week.

The isochronic map presents no disturbing anomalies. Earliest by far is a small number of fairs in North Dakota, with dates falling in early July. Probably the most important group of fairs in the country, including the heart of the Midwest,

¹⁵ Charles M. Andrews, "Colonial Folkways," *The Chronicles of America Series*, IX, (New Haven, 1919): 121.

¹⁶ G. M. Wrigley, "Fairs of the Central Andes," *Geographical Review*, VII (Feb. 1919): 74.

¹⁷ Where the figures required it, states were divided into two or more parts. Isolated anomalous dates were disregarded.

¹⁸ *History of Agricultural Societies*, p. 195.

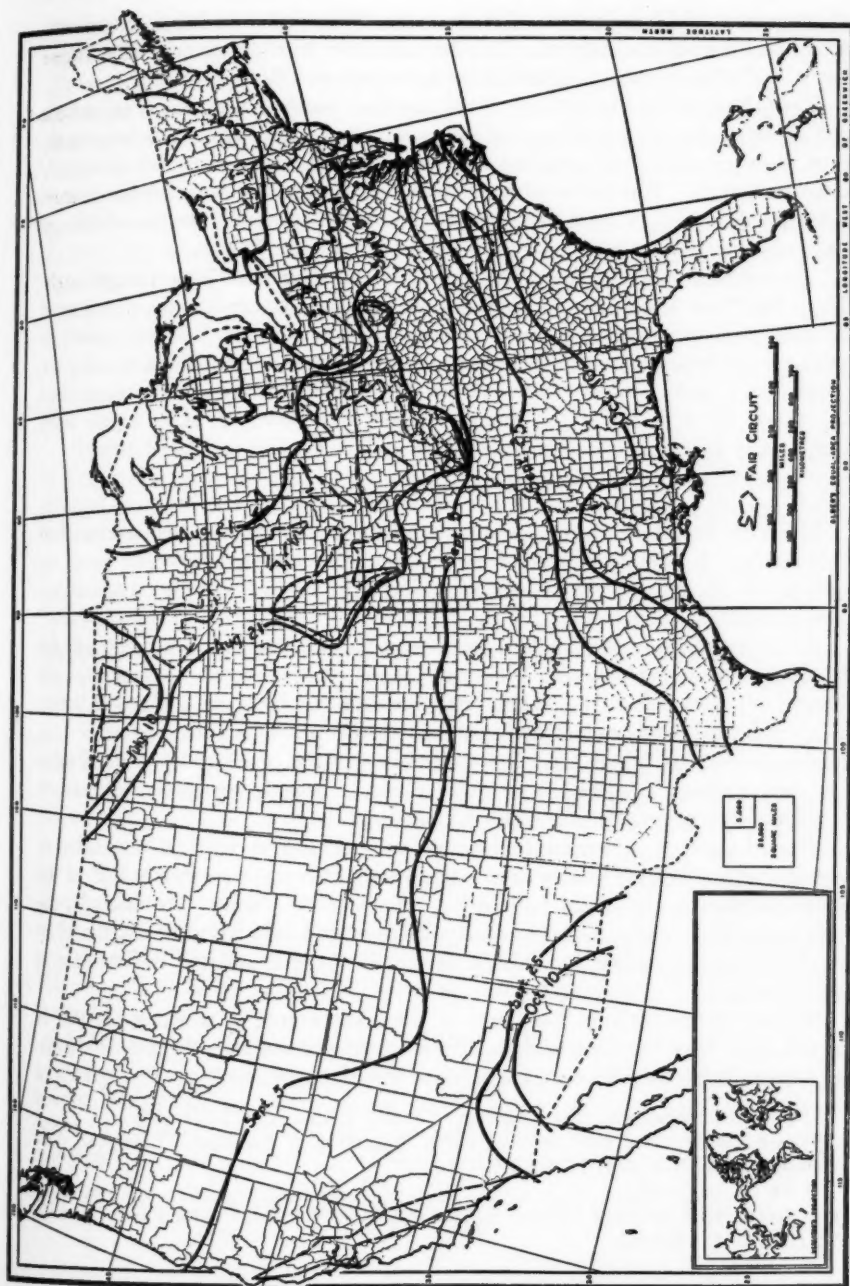


FIG. 6. The fair season, 1949. Isochrones are based on median dates for whole or parts of states. Circuits show the peripheries of the areas involved.

all or portions of Ohio, Indiana, Illinois, Iowa, Wisconsin, and Minnesota, centers in time on the middle of August. This date may have been chosen originally because normally the hay is cut, the small grains harvested, and the corn laid by.

The initial date for fairs in the Northeast and Pacific Northwest is around the first of September. From these beginnings fairs are held progressively later southward, ending in late October along the southern border of the country from California to Florida. It is still a fairly common practice for race-horse owners to start their annual campaigns in the northern states and work gradually southward through a succession of fairs, finally taking up winter quarters in Florida.

The association of each fair with a particular calendar week is so strongly established that "fair week" has become axiomatic. Most commonly the duration of the individual fair is for the six days from Monday through Saturday, although many are for less, frequently three days, and some few, especially state fairs, for longer than a week. Within fair week one day is traditionally more important than the others. Crowds are larger, though actually attractions are at no higher level than on any other day. Most commonly the climactic day is Thursday.¹⁹

LOCALIZATION OF THE FAIR

The most important function of market fairs is commercial, so that command of trade territory is a chief factor in locating them. The American agricultural fair, on the other hand, is primarily educational in purpose; thus quite different considerations govern its location.

Allix²⁰ has stressed the vital importance of the trade territory or "umland" for the European market fair, and Wrigley²¹ has noted that Andean Indian fairs are situated "at some equating point for the movement of products and people." Site advantages for exchange are found in the contact zone between two regions of contrasting production; where there is a natural or artificial convergence of transportation; and at points where some powerful attraction, perhaps religious, political, or traditional, brings trade-minded peoples together.

The educational American county fair as a quasi-governmental institution is normally situated at the county seat. The state fair is most commonly held in the capital, or possibly the largest, city, if the two are not the same. For example, the Iowa state fair is held at Des Moines, the Minnesota fair in Minneapolis, the Wisconsin fair at Milwaukee, the Illinois fair in Springfield, and the Indiana fair at Indianapolis.

Transportation facilities have been of some importance in selecting the site of the fair, or at least have helped determine its degree of success. In pre-automobile days some small local fairs were accessible only with horse and buggy.²² Patrons of

¹⁹ See Elsie Singmaster, "Big Thursday," *Century*, LXXI (Jan. 1906): 364.

²⁰ André Allix, "The Geography of Fairs: Illustrated by Old-World Examples," *Geographical Review*, XII (Oct. 1922): 568.

²¹ *Op. cit.*, pp. 77-78.

²² Such a fair is described for New England of 1914 in "The Spirit of the Fair," *Scribner's*, LVI (Oct. 1914): 552-553.

the larger fairs came in greatest numbers by rail. Today travel to fairs is almost exclusively by automobile, as attested by the characteristic masses of parked cars. However, since few new fairs are being established, the considerations of an older era of transportation remain dominant. It is notable in this connection that the county fair still draws the bulk of its attendance from rural sections. It is probably the rule rather than the exception that the sophisticated townsman resident in the county seat does not attend the fair.

With infrequent departures, the fairgrounds lie at the edge of the community in which they are situated. There are instances of fairs surrounded by an expanding city, but few manage to survive such competition for space. The fair does not need and usually can not command highly productive land. However, it must have flat terrain for buildings and race track, a supply of good water for people and livestock, and it profits from a grove of trees to shade picnickers and trailer living quarters.

SUMMARY AND CONCLUSIONS

Despite European antecedents and counterparts, the American agricultural fair is clearly distinct from any other. Originating in the New England-New York cultural nucleus, it was designed to appeal to the small, prosperous, general farmer, and has never been highly successful among other groups.

From the Northeast the fair spread first to New England colonies in the Midwest, where natural and cultural conditions favored its maximum development. Where contiguous areas possessed a like economic and social structure, the fair spread vigorously, even if there was no leavening of New England settlement. Thus large sections of Canada, Pennsylvania and other Mid-Atlantic states, and much of the Border South were eventually incorporated into the area where the tradition of the American agricultural fair is firmly established.

The fair was moderately successful in the upland South of small, independent farmers. It was never deeply rooted in the outer coastal plain dominated by large plantations. West of the humid Corn Belt the density of the standard fair lessened in accordance with the sparser population and the growing specialization of agriculture. Discernible for nearly a century in the distributional pattern of the Far West have been two north-south lines of fairs, the one marking Mormon settlements centering on Salt Lake, and the other following the agricultural coast from Washington to California. Finally, west across the Pacific it was the American rather than the English variety of agricultural fair that became established in New Zealand and Australia.

In focus of origin and area of enthusiastic acceptance, the fair shows rather close agreement with several other culture traits. Conspicuous among them are the covered wooden bridge and a special regard for the standard-bred, light harness horse. Like these associated traits, the agricultural fair is a marker of cultural affiliations and cleavages, some of which deviate from commonly accepted notions.²³

²³ See "The American Covered Bridge," *Geographical Review*, XLI (Jan. 1951).

THE USE OF DEFORMATIONAL DATA IN EVALUATING WORLD MAP PROJECTIONS

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THE devising of new systems of map projection apparently holds a fascination quite out of proportion to other projection problems. Particularly does this seem to be true when one considers the modern literature concerned with the choice and the evaluation of map projections; with only a few notable exceptions, there seems to be comparatively little cartographic research aimed at the better selection of projections. Yet the modern cartographer appears reasonably assured of a constant supply of new projections. The problem of choosing a projection is, however, the major portion of the cartographer's concern with projection. Without intent to depreciate in any way developments in an interesting field, this author cannot help but conclude that the need for new projections is far overshadowed by the need for a rational basis for evaluating and choosing from the projections now available.

Except when the proposed map clearly dictates a specific projection for a specific use, *e.g.* Lambert or Mercator for navigation, it may be stated as a general rule that the importance of proper selection varies directly with the size of the area to be presented. Hence the most difficult and important selection is choosing a projection on which to present the whole earth. Once the primary purpose of a map has been established, *e.g.* distribution, as well as the projection property necessary (equivalence), the cartographer still has considerable choosing to do. To illustrate his very real dilemma, there are at least, a half dozen conventional, easily constructed, equivalent world projections. There actually is no limit to the number of possibilities. Most of them can easily be made into oblique phases. The majority, probably, lend themselves to interruption. And, more important, the land areas may be plotted in an infinite number of ways depending upon the one or several central meridians chosen. Clearly the cartographer needs some basis for evaluation and selection from this truly imposing array of possibilities.

The most useful basis would, of course, be some sort of composite diagnosis of the purposes of the map, which would have as a corollary a prescription of the solution. Such is clearly not possible. The cartographer, lacking such a nostrum, can only proceed to narrow the field as far as possible with the aid of measurable characteristics and then make his choice from the remaining alternatives.

The projection requirements of every map are theoretically different. The proposed map may dictate straight parallels, or straight meridians, or both; it may require equivalence, or azimuthality, or some other property. Yet when the cartographer has threaded his way through the list and has eliminated all the inappropriate projections, he must still choose from a large number of possibilities. Both the

appearance of the grid and the properties of the projections are in a sense measurable. The question then arises whether there are some additional measurable qualities which will help to eliminate other undesirable projections (for the purpose at hand) and narrow the remaining group from which a choice must be made.

In addition to the projection property and the visual characteristics of the grid another measurable quality of a projection which is important in selection is the distribution of the inherent deformation. Deformation, of course, must occur on any projection. It does, however, differ from projection to projection in kind and amount. It is generally recognized that there are three major forms of deformation which occur when a spherical surface is transformed to a plane surface:

1. Alteration of angles at a point.
2. Alteration of areas at a point.
3. Alteration of large "shapes", i.e., alteration of the distance and direction relations between two or more points.

The last named distortion does not appear to be susceptible to measurement and exact expression, at least at present. The best attempts have been visual as in the well known presentation of the man's head by Reeves or the less notorious, but better work of Fisher and Miller.¹

The first and second forms of deformation have been more fully investigated and their analysis is a matter of record. Germain in his treatise published in 1865 first considered the desirability of analysing the distribution of the deformation as an aid in selecting a projection. It remained for M. A. Tissot to develop the laws of deformation and to illustrate one form of their application.² In general Europeans were unstinting in their praise of Tissot's work. Zöppritz, Hammer, Bludau, Behrmann, Eckert, and others applied his methods and the results appeared in technical journals and textbooks. English and American evaluations have been more critical, and Tissot's work is distinguished by its relative rarity in English. A full account of his procedure is contained in a publication of the Coast and Geodetic Survey,³ and an excellent application of Tissot's work by F. J. Marschner appeared in the *Annals* in 1944.⁴ The reader is referred to these sources for a fuller account in English of Tissot's methods. A brief resumé of the principles he developed is included below in order that the application of the law of deformation here suggested will be more meaningful.⁵

¹ See the discussion in Fisher and Miller: *World Maps and Globes*, New York, 1944, pp. 129-135.

² M. A. Tissot: *Mémoire sur la Représentation des Surfaces et les Projections des Cartes Géographiques*, Paris, 1881. The memoir had been previously issued in part and without the 60 pp. of deformation tables in Vol. XVII, XVIII, XIX, 2nd Series of the *Nouvelles Annales de Mathématiques*.

³ Oscar S. Adams: *General Theory of Polyconic Projections*, Sp. Publ. No. 57, Coast and Geodetic Survey, Washington, 1934, pp. 153-163.

⁴ F. J. Marschner: "Structural Properties of Medium- and Small-scale Maps," *Annals of the Association of American Geographers*, XXXIV: 1-46.

⁵ The resumé which follows (and Fig. 1) is modified in part from the explanation of the law by Marschner, *ibid*: 5-8, who graciously gave his permission for its use.

THE LAW OF DEFORMATION

Tissot demonstrated that when a spherical surface is transformed into a plane surface there occurs more or less transformation of the angles and surface areas around each point. On the sphere⁶ there are at each point on the surface an infinite number of tangents each of which, of course, represents a direction on the sphere. The law of deformation states that, whatever the system of representation, *there are at each point of the spherical surface at least two tangents perpendicular to each other which will reappear at right angles to each other on the projection*, although all the other angles at that point are altered from their original position. An infinitely small circle, the center of which is the intersecting point of the tangents on the spherical surface, will be deformed on the projection and become an ellipse. The two perpendicular diameters of the circle, which retain their relative positions on the projection, constitute then the major and minor axes of the ellipse. The function of the ellipse is that of an indicator in that it provides comparable values with reference to the original circle. The ellipse is on that account referred to as the indicatory ellipse or the indicatrix.

For the purpose of comparing alterations in the linear and angular elements on different projections, only the maximums for each point are needed. The semimajor and semiminor axes of the indicatrix denote the maximum changes in scale, and at the same time provide the necessary data for determining the angular deformation and for the areal exaggeration. The semimajor axis $OA = a$ (Fig. 1), and the semiminor axis $OB = b$, are expressed numerically in terms proportionate to unity, this being the radius of the original circle, $r = OM = 1$.

All points in the circumference of the circle necessarily have their counterparts in the periphery of the ellipse, but only one point within a quadrant is subjected to the maximum angular deflection from its original position with reference to the coordinates of the quadrant. The point subjected to the greatest deflection is identified in the circumference of the circle with M , and has its counterpart in the periphery of the ellipse in point M' . As a consequence, the original angle $MOA = U$ is altered to $M'OA = U'$, and the difference of these two angles, $U - U' = \omega$, denotes the maximum possible angular deflection within one quadrant.

If an angle were to have its sides located in two quadrants and if they were to occupy the position of maximum change in both directions, then the angle in question would incur the maximum deflection for one quadrant on both sides, so that 2ω denotes the possible maximum angular change that may occur at a point.

Changes in the surface area may or may not be a corollary to the transformation of the circle into an ellipse. If there has been a change in the surface area its magnitude can be readily established by comparing the areal contents of the original circle with that of the indicatrix. The area of the circle is $r^2\pi$, while the area of the ellipse is $ab\pi$. Therefore, since the axes of the indicatrix are based on the unit circle in which $r = 1$ and since π is a constant, the product of $ab = S$ fully expresses the areal relationship between the ellipse and the circle. For the purpose of comparing map

⁶ Since we are concerned in this study only with world maps the complications introduced by the spheroid are ignored.

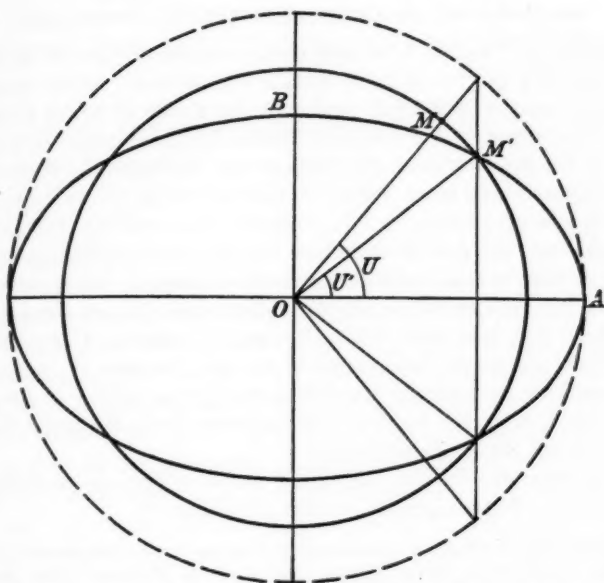


FIG. 1. (From Marschner) — The indicatrix in the above illustration has been constructed as an equal-area representation of the circle to which the following indices apply: $OM = r = 1$; $OA = a = 1.25$; $OB = b = 0.80$; $MOA = U = 51^\circ 21' 40''$; $M'OA = U' = 38^\circ 39' 35''$; $U - U' = \omega = 12^\circ 40' 50''$; $2\omega = 25^\circ 21' 40''$; $ab = S = 1.25 \times 0.80 = 1$.

projections only a , b , 2ω and S are needed as indices, and if the condition of equivalence is satisfied even S can be omitted.

So far, the discussion of the indicatrix has been based on the supposition that the original circle always appears in the representation in the standard form of an ellipse; this need not necessarily be true. On conformal projections the scale, by definition, is the same in every direction at a point. The scale differs, however, from point to point. It will be equal to unity at some points; it will be greater or less at others; but it will always be the same in every direction around a point. That is to say, $a = b$. Hence the angular relations around a point will be the same on a conformal projection as they are on the sphere.⁷ On conformal projections the indicatrix thus appears in the form of a circle, but the indicatrix will differ in size from the original circle. Only on standard lines or at standard points represented without exaggeration is the original size retained in the representation. Under these circumstances, the indicatrix can be considered as a special case of the ellipse in which a equals b , but does not equal 1. With a and b being equal, the index of areal change is derived from the square of the radius of the indicatrix, $S = a^2$.

⁷ But not between points—a fact commonly misunderstood. Bearings at each point of a conformal projection are arranged as in a standard compass rose, but directional relationships between points are not necessarily correct.

THE INDICATRIX AS AN AID IN SELECTING A PROJECTION

The indices a , b , S , and 2ω have been used a number of times in the past as aids to the selection of a projection for a specific use or area. What amounted to a debate in print concerning the best projection for a map of Africa utilized the indicatrix as an argument.⁸ The Zöppritz-Bludau *Leitfaden* employed the indicatrix in presenting the deformational distributions on projections.⁹ Werenskiöld employed the indicatrix and mean values of deformation as an evaluating tool when presenting his new projections.¹⁰ His procedure was similar to that of Behrmann who apparently was the first to undertake the rating of projections of the whole earth by comparing the mean values of their deformation.¹¹ Behrmann's procedure was to plot the values of maximum angular deformation (2ω) on a number of equal-area projections and then draw lines of equal deformation. (*Aquideformaten*).¹² By means of the planimeter he determined the area between succeeding isograms and then plotted the areas against the deformation in the manner of a hypsographic curve (See Fig. 5, 6.). He was thus able to extract from the graph the mean deformation value for the entire projection.

Behrmann rated the various equivalent world projections according to their mean deformation. His ratings are, in part, as follows:¹³

⁸ K. Zöppritz, "Die Wahl der Projektionen für Atlanten und Handatlanten," *Zeitschrift der Gesellschaft für Erdkunde zu Berlin*, Bd. 19, 1884: 1 ff; E. Hammer, "Über Projektion der Karte von Afrika," *ibid*, Bd. 24, 1889: 222 ff; A. Bludau, "Die flächentreue transversale Kegelprojektion für die Karte von Afrika," *ibid*, Bd. 26, 1891: 145 ff; E. Hammer, "Bemerkungen über Projektion der Karte von Afrika," *ibid*, Bd. 28, 1892: 69 ff; A. Bludau, "Die flächentreue Azimutalprojektion Lamberts für die Karte von Afrika," *Petermann's Mitteilungen*, Bd. 38, 1892: 214 ff.

⁹ Karl Zöppritz, *Leitfaden der Kartenentwurfslehre*, 3rd Ed., revised and enlarged by Alois Bludau, Leipzig, 1912.

¹⁰ W. Werenskiöld, "A Class of Equal Area Map Projections," *Det Norske Videnskaps-Akademi i Oslo, Mat.-Naturv. Klasse*, No. 11, 1944 (In English). Werenskiöld's procedure of giving complete tables of angular alteration and drawings of the projections with the deformation isograms thereon should be standard procedure for anyone suggesting new projections or modifications of old ones.

¹¹ Walther Behrmann, "Zur Kritik der flächentreuen Projektionen der ganzen Erde und einer Halbkugel," *Sitzungsberichte der Königlich Bayerische Akademie der Wissenschaften, Mathematisch-physikalische Klasse*, Munich, 1909, 13 Abhandlung.

¹² "Anamorphism" as a term applied to deformation in map projections has been suggested. Lines of equal deformation would then be isanamorphic lines. The term seems somewhat cumbersome. Furthermore, it may apply equally to angular or to areal deformation and it hardly seems necessary to introduce a term between the generic and the specific. See Marschner: *op. cit.*, p. 6 and footnote.

¹³ Behrmann: *op. cit.*, p. 35. Behrmann also computed the deformation values for a number of cylindrical equal-area projections with various standard parallels. Those with standard parallels of 0°, 10°, 20°, and 40° rate between Eckert's No. IV and the Mollweide. He thought so highly of the cylindrical equal-area projection with standard parallels at 30° that he published an elaborate sample under the title "Die beste bekannte flächentreue Projektion der ganzen Erde," *Petermann's Mitteilungen*, LVI (II), 1910, pp. 141-144. It is interesting to note that Werenskiöld, (*op. cit.*), calculated the exact latitude of the parallel of transection for the

TABLE I

Projection	Mean Maximum Angular Deformation
1. Cylindrical Equal-area with standard parallels-30°	27°06'
2. Eckert's No. IV.	27°34'
3. Mollweide Homolographic	32°07'
4. Eckert's No. VI.	32°19'
5. Aitoff	37°34'
6. Eckert's No. II.	38°18'
7. Sinusoidal	38°40'
8. Lambert Equal-area	49°40'

Behrmann's determinations were an important step in the right direction and are particularly valuable since he presents each of the projections with the lines of equal angular deformation drawn thereon. His method of rating the projections requires however, a dubious assumption with respect to the logic involved in choosing a projection. The mean value for the entire earth's surface would be of value only in the mapping of a distribution wherein no section of the earth were of more concern than any other. Although such a situation is by no means impossible, it would be relatively rare. The vast majority of maps (including world maps) present data and relationships which are of more significance in some areas than in others. Consequently the major concern would be for deformation in the areas of interest.

AREAS OF MAJOR INTEREST

Most geographical maps are of the land and include in many cases the adjacent waters. Consequently a mean angular deformation value determined for those areas is more meaningful than is a figure, such as Behrmann's, which rates the projection on the basis of the entire surface area of the sphere.

Rather arbitrarily, the areas of major interest on the majority of world maps was outlined. In addition to the land areas themselves a number of adjacent or included water bodies were enclosed. For example all the islands of the Northern Territories in North America, the entire Caribbean region, the North, Baltic, Mediterranean, Caspian, and Red Sea areas were included with the land as well as all the enclosed and island areas of Australasia.

The areas outlined by the heavier line in Figure 2 were selected. The area included within this line and bounded by each degree of latitude was determined.¹⁴ The following summary (Table II) by five degree latitude bands (which may be of interest in other connections) was thus obtained.

cylindrical equal-area which gives the minimum value and found it to be 28°06.1', which provides a mean maximum angular deformation of 26°46'.

¹⁴ The results were determined by outlining the areas selected on suitable charts which showed a one degree grid. The number of 1° Long. segments or the portions thereof occurring within the enclosed area in each 1° Lat. band were counted. The area of a spherical segment bounded by 1° Lat. and 1° Long. being known it was a simple matter to derive the totals.

TABLE II
LAND AND ADJACENT SEA AREAS BY FIVE DEGREE BANDS, IN KM²
(See Figure 2 for limits of areas included)

Latitude	Northern Hemisphere	Southern Hemisphere
0°-5°	5 776 800	6 649 100
5°-10°	7 086 700	6 687 500
10°-15°	7 728 000	5 120 100
15°-20°	8 490 800	5 123 100
20°-25°	8 765 400	5 033 800
25°-30°	9 398 900	4 335 300
30°-35°	9 381 000	3 051 000
35°-40°	9 579 400	1 278 600
40°-45°	9 316 400	704 700
45°-50°	9 043 200	394 600
50°-55°	9 063 100	161 700
55°-60°	8 205 500	0
60°-65°	8 121 800	10 900
65°-70°	6 714 000	1 657 300
70°-75°	2 771 800	4 037 100
75°-80°	1 354 500	4 005 200
80°-85°	420 300	2 661 600
85°-90°	0	970 700

THE MILLER CYLINDRICAL

In 1942 O. M. Miller of the American Geographical Society suggested several cylindrical projections as possible bases for popular world maps.¹⁵ One of two variations of the Mercator projection was selected.¹⁶ This was used extensively in the State Department and has been utilized for a large map of the world by the American Geographical Society. Because the projection can be easily constructed, because it is cylindrical and is therefore the least complicated deformation-wise of the various systems of projection, and because it is neither equivalent nor conformal, it was decided to test the system on this projection. As is apparent the lines of equal deformation on any cylindrical projection will parallel the origin of the projection, the origin usually being the equator. Consequently, it was necessary only to calculate the amount of deformation at the various latitudes. The scale alteration values along the parallels (*a*) and meridians (*b*) are given in Table III, together with the derivative values for angular deformation (2ω) and area deformation (*S*).

Figure 3 presents the angular alteration in categories on the Miller Cylindrical. It is apparent that the projection is "virtually conformal" at the equator. The deformation increases toward the poles. It is important to note that the rate of change of angular deformation increases rapidly with distance from the equator. The acceleration does not really get under way, so to speak, until the higher latitudes are reached. Thus, one part of Mr. Miller's aim of balancing the deformation was accomplished by decreasing the deformation in the lower latitudes at the expense of

¹⁵ O. M. Miller: Notes on Cylindrical Map Projections, *Geographical Review*, XXXII, 1942: 424-430.

¹⁶ The modification consisted of introducing a constant into the formula for the spacing of the parallels in the Mercator projection. The modified formula became: $Y = (5R/4) \cdot \log_e \tan (45^\circ + 2\phi/5)$.

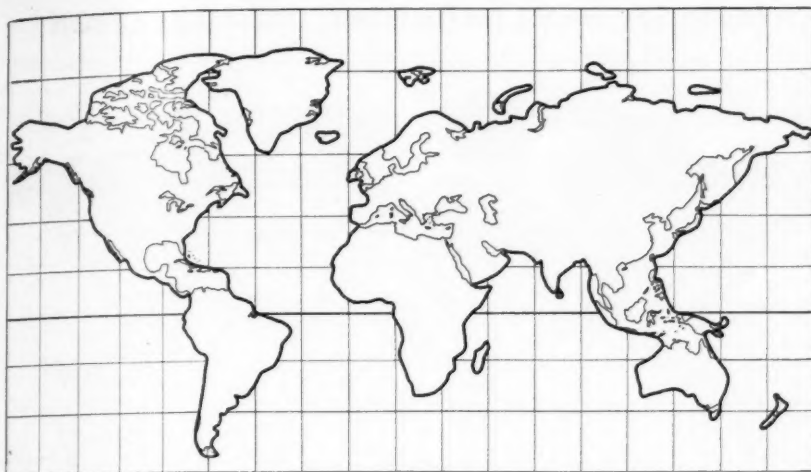


FIG. 2. Land areas and adjacent and enclosed waters.

TABLE III
DEFORMATION VALUES FOR MILLER CYLINDRICAL PROJECTION

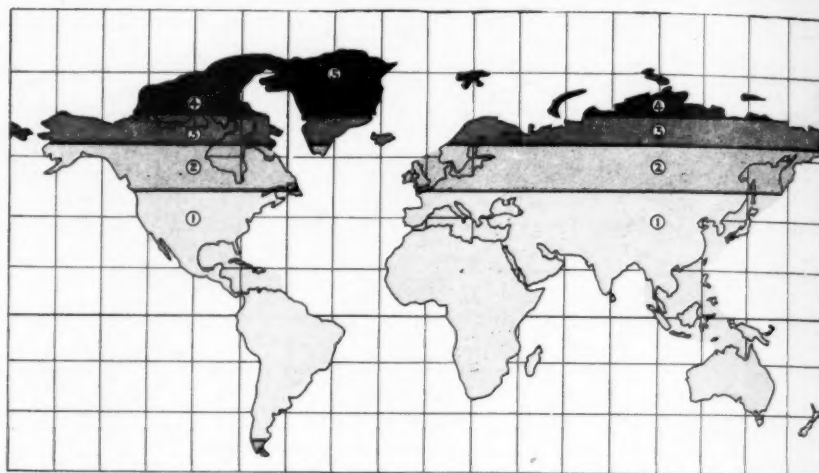
Latitude	<i>a</i>	<i>b</i>	2ω	<i>S</i>
0°	1.000	1.000	0°00'	1.000
10°	1.016	1.009	0°16'	1.025
20°	1.064	1.040	1°02'	1.106
30°	1.155	1.094	3°02'	1.264
40°	1.306	1.179	5°51'	1.540
50°	1.556	1.305	10°02'	2.031
60°	2.000	1.494	16°29'	2.988
70°	2.924	1.788	27°54'	5.199
80°	5.760	2.283	51°14'	13.150
90°	∞	3.236	180°00'	∞

the higher latitudes.

By applying the procedures outlined previously the mean angular deformation (maximum) can be calculated¹⁷ (See Fig. 5). Excluding Antarctica the mean deformation for the land and adjacent sea areas is 6°22'. Antarctica is excluded from the mean values for its representation is of little significance on most general world maps, and its presence would only serve to magnify the mean value. The mean value of 6°22' for angular deformation is very low and seems particularly so when one appreciates how great the angular alteration is in the land masses of the higher latitudes. From the point of view of angular relations the Miller is an excellent projection where the advantages of the cylindrical form are desired without the excessive rate of scale change of the Mercator.

¹⁷ The maximum possible deformation that can occur at any point is used rather than one half that for the reason suggested in connection with Figure I.

MILLER CYLINDRICAL PROJECTION



MAXIMUM DEFORMATION of
ANGLES at ANY POINT

5	OVER 40°
4	30°-40°
3	20°-30°
2	10°-20°
1	0°-10°

ANGULAR DEFORMATION
on the LAND AREA

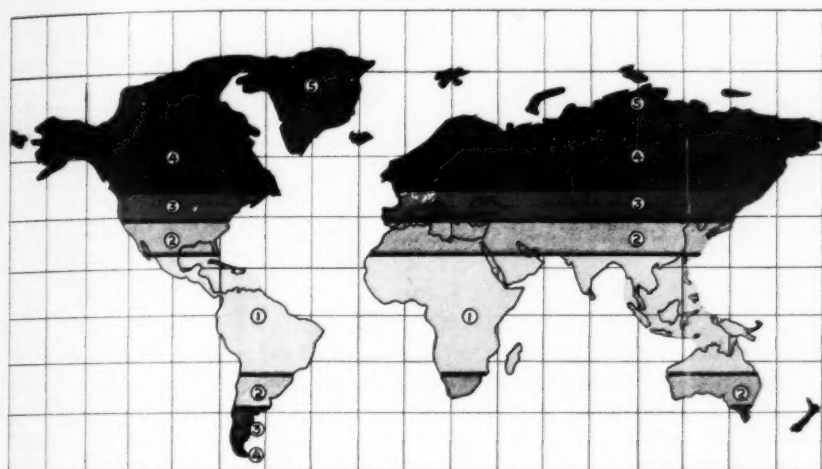
Mean Deformation (max.)
for the land (excl. Antarctica)
6° 22'

FIG. 3. Angular deformation on the Miller Cylindrical projection.

Deformation of area is not quite so clear a concept. The value, S , is the product of ab and is an index of the relative size of the theoretical circle. Size is difficult to think of as being right or wrong. For example, the Mercator projection is commonly considered as "distorting" areas in the higher latitudes. Yet, as on all conformal projections, there is no angular alteration at any point on the Mercator. Consequently every point is "correct" with respect to quality of representation and is only larger or smaller than it should be relative to a point at some other latitude. Of course the length of the equator on a Mercator projection is the same as that on the globe whose radius is used for construction purposes; but, practically speaking, it is as true to say that the equator is too short in comparison with the 40th parallel as it is to state the converse. Any portion of the Mercator, given its own scale, is just as "correct" as any other portion; only the rate of change varies. One should probably speak of area exaggeration rather than deformation.

Figure 4 shows the change of area on the Miller projection, the values again being derived from the scale values a and b . It may be seen that the pattern follows

MILLER CYLINDRICAL PROJECTION



EXAGGERATION of AREA at
ANY POINT (Equator = 0)

5	OVER 400%
4	200 to 400%
3	50 to 200%
2	20 to 50%
1	0 to 20%

DEFORMATION of AREAS on the LAND

Approximate Mean Exaggeration
(Excluding Antarctica)
90.4%

FIG. 4. Area exaggeration on the Miller Cylindrical Projection.

that of the angular alteration, and the rate of change also increases as the pole is approached. As in the case of the angular deformation we are able to arrive at a mean value in the same way (See Fig. 6). If the equator is considered as 0% exaggeration, and excluding Antarctica, we can state that the mean exaggeration for the land and adjacent sea areas is 90.4%.

COMPARISON WITH ANOTHER CYLINDRICAL PROJECTION

At the same time that he proposed the above projection which has subsequently found favor, O. M. Miller suggested still another modification of the Mercator formula.¹⁸ In order to illustrate the proposed approach to selecting and evaluating projections it was decided to analyze this projection in the same manner. The scale departures along the parallels (*a*) and meridians (*b*) and the values of 2ω and S are given in Table IV.

¹⁸ The formula for the spacing of the parallels in this modification (listed as 4a on pp. 424-425 of Miller, *op. cit.*) is $Y = (3R/2) \cdot \log_e \tan (45^\circ + \phi/3)$.

TABLE IV
DEFORMATION VALUES FOR THE
CYLINDRICAL PROJECTION IN WHICH THE SPACING OF
THE PARALLELS IS $Y = (3R/2) \cdot \log_e \tan (45^\circ + \phi/3)$

0	a	b	2w	S
0°	1.000	1.000	0°00'	1.000
10°	1.016	1.007	0°16'	1.022
20°	1.064	1.028	1°18'	1.094
30°	1.155	1.064	4°42'	1.229
40°	1.306	1.119	8°50'	1.461
50°	1.556	1.197	15°00'	1.862
60°	2.000	1.305	24°18'	2.612
70°	2.924	1.457	39°08'	4.261
80°	5.760	1.675	64°46'	9.645
90°	∞	2.000	180°00'	∞

A comparison of the values for angular and areal deformation illustrates an important relationship between the two. This relationship which should obtain among variants of any one system of cylindrical projection is that the angular deformation will vary inversely with the areal exaggeration. The rate of variation will depend upon the system of projection. This relationship is clearly seen in the two graphs below which show angular deformation for the two projections plotted against the land area (Fig. 5) and areal exaggeration plotted in a similar manner (Fig. 6).

If we compare the mean values derived from the above curves we have the following relationship in Table V. Accordingly, if we were limited in our choice to

TABLE V
COMPARISON OF MEAN DEFORMATION VALUES OF MILLER I AND II
FOR LAND AREAS (EXCLUDING ANTARCTICA)

Projection	Mean angular deformation	Mean areal exaggeration
Miller I	8°50'	68.9%
Miller II (Miller Cylindrical)	6°22'	90.4%

these two cylindrical projections we would choose Miller I for a better representation of areas. Obviously, one's choice would not be limited to these two projections, but the principles bearing upon selection as between variants still applies. Other elements of selection are also important. For example, both these projections provide small angular and areal deformation in the lower latitudes as suggested by Figures 5 and 6 and would, no doubt, be good choices for a world map the major interest of which is focused on those latitudes. The converse applies to the higher latitudes.

COMPARISON OF TWO EQUIVALENT PROJECTIONS

A large proportion of the geographer's concern with map projections centers

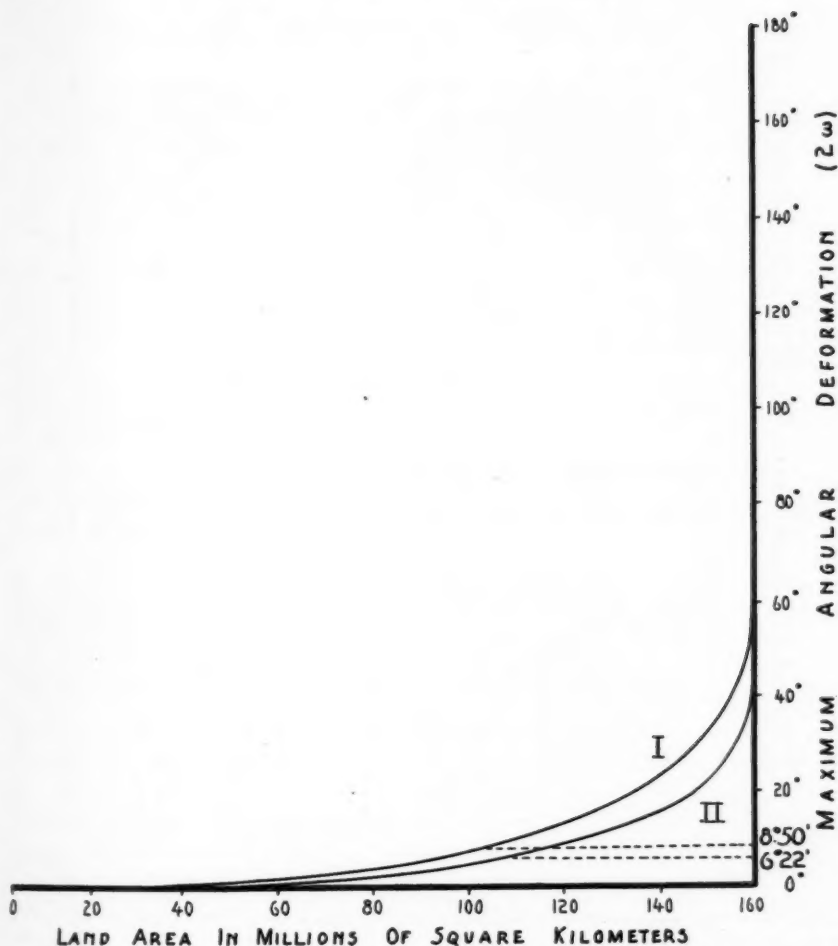


FIG. 5. Graph of angular deformation plotted against land area on the two Miller cylindrical projections. The first of Miller's projections (Table IV) is designated as I and the familiar Miller Cylindrical as II.

around that class of projections which maintains a constant area relationship between the earth and the representation. In terms of the indicatrix $S = ab = 1$ anywhere on the projection. The indicatrix will be an ellipse and the product of the axes will always be unity. The choice of an equal-area projection for the whole earth has always vexed the cartographer and there have been many attempts at reducing the inescapable angular alteration. To illustrate the value of using mean deformation and graphic portrayals of the distribution of angular alteration two fa-

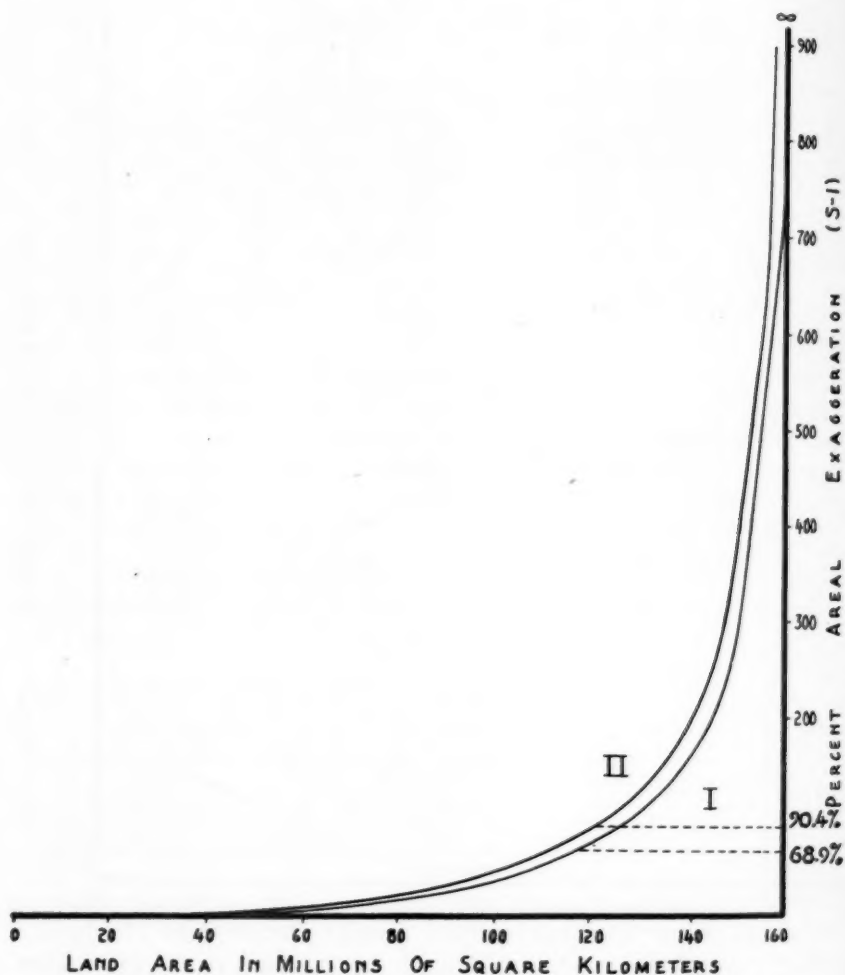


FIG. 6. Graph of areal exaggeration plotted against land area on the two Miller cylindrical projections. The curves are identified as in Figure 5.

miliar equivalent world projections, the Homolosine and the interrupted Aitoff, have been analysed.

The Homolosine was developed by Professor J. Paul Goode after recognizing the value of interruption and after he had tried it out with both the sinusoidal and the Mollweide projections. He disliked the "pointedness" of the Sinusoidal and the excessive attenuation of the equatorial regions in the Mollweide. Consequently he fitted the two projections together near the fortieth parallel to give the continents

GOODE'S HOMOLOGINE PROJECTION

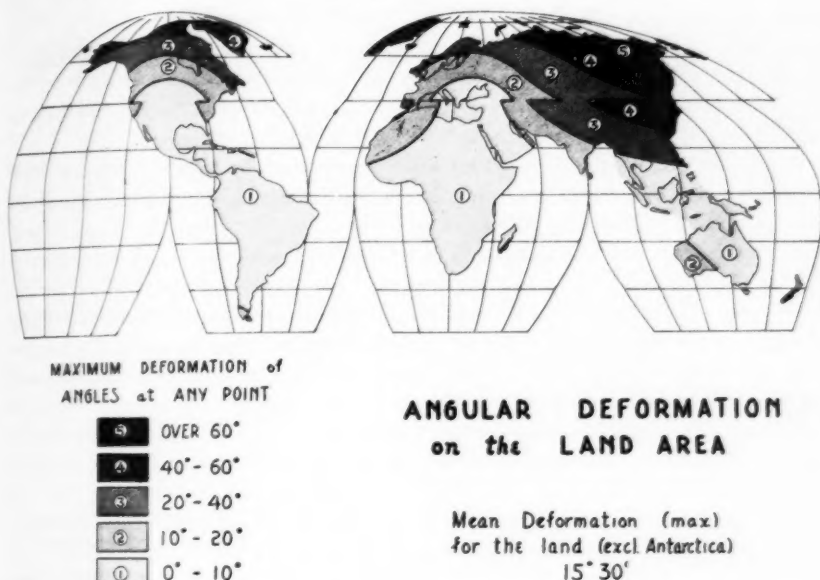


FIG. 7. Angular deformation on the Homolosine projection. (Goode).

"better form than in any other world projection."

Tables showing the angular deformation of the sinusoidal projection are available,¹⁹ and less detailed, but complete, values are also available for the Mollweide.²⁰

The pattern of deformation on the land area is shown in Figure 7, and the relationship of the two projections is clearly evident, especially at their juncture. Only two points of the entire Mollweide projection are without angular deformation these being located near the fortieth parallel on the central meridian. This is in direct contrast to the sinusoidal for there is no deformation along the equator and central meridian. On each of the projections the deformation increases rapidly in the northeast, northwest, southeast and southwest directions from the origin. Consequently, on the Homolosine we find the USSR and the Asiatic centers of population being in an unfortunate situation. They are poorly represented while much less deformation occurs in the equatorward areas.

¹⁹ The computed values appear in a number of places: Tissot, *op. cit.*, Table XIV, gives values only for the first quadrant by fifteen-degree intervals; Zöppritz-Bludau: *Leitfaden*, p. 171, presents values by five-degree intervals, but also only for the first quadrant; Behrmann, *op. cit.*, p. 46, presents the values for the second quadrant by ten-degree intervals.

²⁰ Behrmann, *op. cit.*, p. 47. Since the values are available for each of the two projections it is a simple matter to combine the values for the Homolosine.

The mean angular deformation for the land area on the Homolosine is $15^{\circ}30'$. Although it has not yet been calculated it would be reasonable to expect that the mean deformation for the land on an "uninterrupted Homolosine" would be in the neighborhood of at least 30° – 35° (See Table I). There is no question that Professor Goode by interruption bettered the representation, to a considerable degree. Whether the probable 15° increase in quality of angular representation overshadows the breaking up of the continuous earth's surface is another question.

Since the possibilities of interruption were suggested by Goode, Professor Finch has interrupted the Aitoff projection and it has become widely known through its use in the Finch-Trewartha *Elements of Geography*. Although the Aitoff projection theoretically does not lend itself to interruption, Finch found that the discrepancies were so small as to be insignificant. The pattern of deformation for the land area is shown in Figure 8.²¹ It is apparent that the pattern is much like that of the Homolosine, but since the parallel and meridian spacing along the equator and the central meridian decrease away from the origin, angular deformation is zero only at the point of origin. Consequently, the "better" angle with which the parallels and meridians meet in northeast, northwest, southeast, and southwest areas is only an illusion. The mean value for the interrupted Aitoff is $15^{\circ}15'$, is slightly better than the Homolosine. This slight advantage may be due to the fact that the central meridian of Eurasia was placed farther east on the interrupted Aitoff, thereby providing a more equable distribution of the deformation for that land mass.

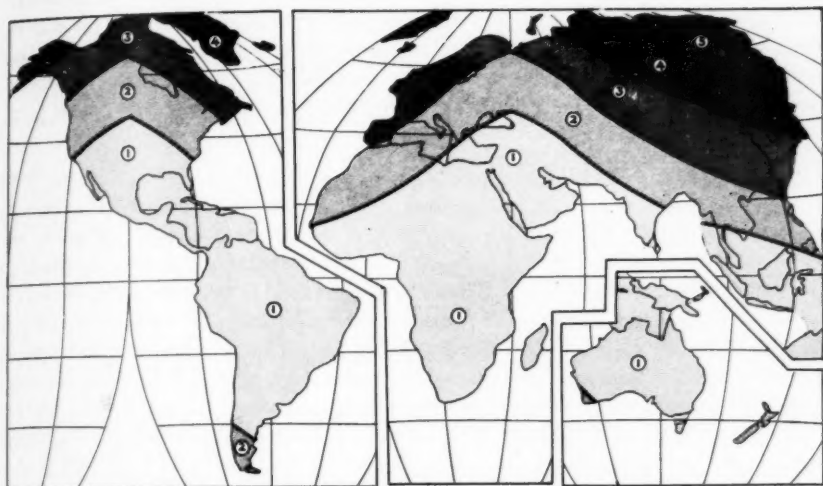
These two projections provide a fortunate example of the utility of the indicatrix and mean values for analysing and judging projections. From the point of view of angular deformation (which is why the projections were interrupted in the first place) both projections for all practical purposes, rate the same. Consequently, we may then eliminate angular deformation as an element of choice between the two, although it would be an important factor to be considered when selecting a projection from a larger number of alternatives. The ultimate choice if we were limited to these two would probably depend upon some element of utility such as straight *versus* curved parallels.

CONCLUSIONS

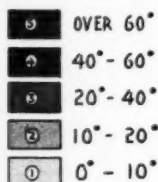
It is possible to evaluate projections by analysing their angular and areal deformation through the use of Tissot's indicatrix. By this procedure we may determine (a) the specific distribution of deformation, and (b) the mean value of the deformation. If these data are derived and analysed for the land areas, the areas of major interest, we have a more precise basis for choice than we have had in the past. If this procedure were followed we would not be so likely to fall into the trap of categorical opinion as has one famous geographer who has reiterated for forty years that "La meilleure projection pour la planisphere est celle de Mollweide." Similarly, we probably should be as thorough as Werenskiöld when presenting new projections and show the values and lines of equal deformation on any new projections

²¹ The deformation values for the Aitoff (Hammer) projection are given in Behrmann, *op. cit.*, p. 48.

AITOFF'S PROJECTION



MAXIMUM DEFORMATION of
ANGLES at ANY POINT



ANGULAR DEFORMATION on the LAND AREA

Mean Deformation (max.)
for the land (excl. Antarctica)
15° 15'

FIG. 8. Angular deformation on the interrupted Aitoff (Finch).

proposed. For example, there has been suggested a series of new equivalent projections for statistical purposes.²² One of these projections, called a flat-polar quartic authalic, has apparently been chosen for hemisphere census maps.²³ The reasons for its choice are not given. It would be interesting to apply the suggested method of analysis to this projection in order to determine whether it in reality does have any merit in comparison with other possibilities. To do so is beyond the scope of this paper.

The determination of the finite deformation inherent in map projections will not, by any means, answer all the questions the chooser of projections will have, as Fisher and Miller have pointed out in their excellent book, *World Maps and Globes*. In addition to obvious aspects of utility, the cognate problem of deformation concerning

²² F. Webster McBryde and Paul D. Thomas, *Equal-Area Projections for World Statistical Maps*, Sp. Publ. No. 245, Coast and Geodetic Survey, Washington, D. C., 1949.

²³ *Ibid.*, p. 12.

the distance and angular relations among the continents is still with us. Although it is doubtful that it is commensurable, it might possibly be approached by some sort of analysis of the rate of change of the angular (or areal) deformation of the land or the land *versus* the sea areas. Finally, the selection of projections ought to be approached in as precise a manner as possible. A quantitative analysis of deformations would help to retard the tendency toward convention or mere inspection on our part.

CROFTING SETTLEMENTS AND HOUSING IN THE OUTER HEBRIDES

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THE Outer Hebrides lie off the northwest coast of Scotland and are separated from it by the Sea of the Hebrides and the Minch. To some extent they serve as a breakwater for the Isle of Skye and the coast of the Northwest Highlands fifteen to forty miles away.

Containing thousands of islands and islets, though fewer than thirty are occupied, the Outer Hebrides are of interest to geographers for several reasons. First the population pattern of the Hebrides is quite in contrast with the other islands and the Highlands of Scotland despite the general comparability of the areas. This endows the Hebrides with special interest to those concerned with the problems of Highland depopulation.¹ Secondly, the generally low-lying character of the islands presents, as Alexander Stevens of the Department of Geography of Glasgow University has pointed out, "a simplification of Highland geography: the conditions of soil and climate without the complications of altitude and position which, from the human point of view, divide up the desert of the Highlands into scattered oases of population."² Thirdly, the development of a system of dual occupations endowing the economy with considerable flexibility and strength deserves study. And, finally, the settlement pattern and the characteristics of croft housing, reflecting as they do a remarkable adaptation to physical conditions, are worthy of the geographer's attention. It is with the last items that this article is concerned.

PHYSICAL BACKGROUND OF THE ISLANDS

The Outer Hebrides extend in a direction NNE-SSW from the Butt of Lewis in the north, 136 miles to Barra Head in the South, with a width varying from a few yards up to 30 miles on the island of Lewis. The main islands, starting at the north, are Lewis-with-Harris, North Uist, Benbecula, South Uist, and Barra. Made up almost entirely of pre-Cambrian Lewisian gneiss, the islands represent the remnants of a very ancient range of hills which rose along the western border of Europe before the British Isles were separated from the continent.³

The islands present considerable diversity of scenery, but perhaps most notable is the intricate interlacing of land and water, both salt and fresh. Fiord-like sea

¹ William A. Hance, *The Outer Hebrides in Relation to Highland Depopulation*, New York, 1949.

² Alexander Stevens, "The Human Geography of Lewis," *The Scottish Geographical Magazine*, XLI, March 1925: 75-88.

³ J. J. Jehu and R. M. Craig, "Geology of the Outer Hebrides," *Transactions of the Royal Society of Edinburgh*, LIII: 64-66, 93-98; LIV: 467-489; LV: 457-488.

lochs, especially numerous along the eastern seaboard, are associated with an abundance of promontories, islands, and reefs, while much of the lower surfaces of the Islands are studded with lakes, ponds, and marshes. One visitor aptly described the Outer Hebrides as "that country where the sea is all islands and the land is all water."⁴

About two-thirds of the surface of the islands is low-lying, either rock covered and rugged, or gently rolling expanses of peat, or flat sandy plains called "machars." The more hilly and mountainous parts of the islands are southern Lewis, almost all of Harris, the eastern side of South Uist, and central Barra. It is indeed unfortunate for the Hebrideans that the mountainous portions do not occur on the westward flanks as on the mainland of the British Isles. The general lack of protection from the prevailing winds and particularly from the winter gales is one of the greatest handicaps suffered by the islanders.

The average annual temperature range in the Hebrides is only about 15° F. (from 41° F. in January to 56° F. in July at Stornoway, Lewis) and the average rainfall varies from 45 to 58 inches at the various stations.⁵ This would at first appear to be a very moderate climate, but the low percentage of possible sunshine received, the very low rate of evaporation and the unfavorable rainfall distribution serve to emphasize the bad features of the temperature and rainfall characteristics. And the climatic element which is usually of least significance, the wind, provides a major inhibitive influence on the islands. Its severity prevents the natural growth of trees. It affects plant growth. The wild oceans whipped up by the wind restrict the fishing industry to a certain extent. The persistent, howling strength of the winter winds is considered by many to have a psychological effect upon the inhabitants. It is primarily the winds, too, which have influenced the design of the "black houses" and which render inadequate much of the recent building on the islands.

Winter winds blow in full force from September until March at an average velocity of 22 miles per hour at the Butt. In the four months from November through February there is recorded at Stornoway an average of 18.4 gales a month and in no month of the year are gales recorded less than an average of seven days. In examining the Hebridean station returns for wind velocity at the Edinburgh Office of the Air Ministry Meteorological Office an empty form was found for the month of March, 1945, upon which appeared the following notation: "The returns for March were blown away in an exceptionally strong gust of wind."

The vegetation and soils of the islands reflect closely the landform and climatic characteristics. The formation of peat moors over much of the surface is a response to the excessive rainfall, the low rate of evaporation, and the low porosity of the underlying rock. These conditions combine to produce over most of the Outer Hebrides sour, water-logged soils with very poor aeration, low fertility, and with very little favorable prospect for economical reclamation. The only areas of good soil occur in narrow stretches along the shore, particularly on the west coast, where

⁴ Quoted in Colin MacDonald: "Agriculture in the Outer Hebrides," *The Scottish Journal of Agriculture*, October, 1919: 465.

⁵ Forms 3211, Air Ministry Meteorological Office.



FIG. 1. "Black House" near Balallan, Isle of Lewis. Doors and windows face east to escape the prevailing strong west and southwesterly winds. Heather rope stays, anchored by rocks, help hold down the thatch roof.

shell sand has made the loose porous "machar" soil. This soil, well adapted to the moist conditions prevailing in the Outer Hebrides, is unfortunately entirely too limited in extent to meet the needs of the crofting population. In fact, three percent of the total acreage of agricultural land on the islands is devoted to crops and less than ten percent is classified as better than rough grazing.

THE CROFTING PATTERN

The crofting system prevails over the whole of the outer islands. This system is one of ancient hereditary tenure of small patches of cultivated land combined with rights of common grazings. On the small occupied plots may be found normally the cottage and outbuildings, a very small kitchen garden, a few tilled fields, with hardy grains and potatoes the predominant crops, and, often, a small area of rotation grass for winter feeding. Cattle and sheep are grazed on the common pasture. Where good meadowland or larger than average areas of good soil are available, these may be enclosed and divided among the individual crofters. In this case, cattle are usually grazed on the better lands while sheep occupy the rougher areas.

Almost all of the land of the islands, including the common grazings, is owned in fairly extensive holdings by single proprietors, limited liability companies, or by the Department of Agriculture for Scotland. The Valuation Rolls classify practically all householders outside of Stornoway as "agriculturists," of whom the vast majority are crofters. Crofters pay an annual rent to the estate for their croft land upon which their cottage is located and which is used for growing crops and for grazing. Their rent also entitles them to use the common grazings of the township for grazing sheep and cattle and for cutting peats. Although there is an official allocation, the "souming," specifying the number of animals to be grazed on the common land by each crofter, it is not adhered to anywhere on the islands. Overgrazing is common almost everywhere and tends to be encouraged by certain governmental subsidies.

In addition to the crofters, there are cottars, squatters, and feuars. Cottars reside on a croft, but pay no rent to the estate. They are often blood relatives of the crofter on whose land they reside and actually represent a concealed form of subdivision. Squatters build their houses on the common grazings, but pay no rent to the estate. They often till a few miserable plots on the peat moors, and may even have cattle and sheep on the grazings, though they have no legal right permitting either. Feuars also dwell on the common grazings, but pay an annual feu duty or rent to the estate and are permitted, therefore, to cultivate a patch of ground around their homes. They have no grazing rights. The presence of squatters and feuars, of course, reduces the amount of common grazing land available to the crofters. Although accurate statistics are not available, the number of feuars, cottars, and squatters is probably about one-fifth the number of crofters. The Lewis Association reported for 1938 a total of 3,750 crofters and 1,050 feuars, squatters and cottars.⁶ The ratio in Lewis is considerably above that for the other islands.

Crofters' rents are substantially the same as those set by the crofters Commission established in 1886. The average rent per croft is something between £1 and £4 and very seldom over £10. In 1906, for example, only 83 out of 3,034 crofts on the valuation roll of Lewis were rented above £4, and the average rent in 1917 was 30s 9d per croft.⁷ A croft house or outbuilding is classed as an improvement on the croft, but, so long as the crofter retains his status and does not become the owner-occupier, his rates remain the same regardless of improvements or increased valuation. A number of loans and grants have been made available from time to time to foster improvement of croft buildings. Taxation rates are legally limited. Crofters can be assessed on only one-eighth of their fair rent, the average annual rate being about 1s 8d to 2s per year. Although the low tax rate is advantageous to the crofters, it also means that the County Council has very little income to expend on improving general conditions for the inhabitants unless sums of money are appropriated from other sources.

Under the favorable tax and rent rates prevailing, the crofters have been loath to become owners of their own holdings. Shortly before his death in 1925, Lord Leverhulme, the proprietor of Lewis, offered to give the land occupied by the crofters to them outright. So great was the fear that loss of crofter status would bring heavier financial burdens that this seemingly generous offer was accepted in only a few isolated cases. As may be judged from the above, the function of the landlord has been very greatly reduced over the years. Legislation since 1886 has, in fact, changed the "possibility of the people being rack-rented into a possibility of the landowners being rack-rated."⁸ Cases have been cited where the rates per croft paid by the landlord exceeded the legal permissible rent.⁹

⁶ Lewis Association, *The Lewis Association Reports, Report I*, Inverness, The Highland News, Ltd., 1945: 13.

⁷ Royal Commission on Housing in Scotland, 1917, p. 212.

⁸ John P. Day, *Public Administration in the Highlands and Islands of Scotland*, London, University of London Press, Ltd., 1918: 383.

⁹ *Ibid.*

The villages and settlements of the Outer Hebrides are, with but few exceptions, located on the sea or along the shores of a sea loch penetrating the interior. This coastal situation is due partly to the importance of fishing, the most widespread of the complementary occupations which characterize the islands. But of greater importance is the soil factor. The sandy "machar" lands, whose fertility is often increased by the addition of shell sand, occur almost exclusively on the coasts, mainly along the western coasts. They are found in narrow strips in the parish of Barvas, Lewis, along the west coast of southern Harris, in the Uists, and on Barra. Sandy soil also occurs on the shores of Broad Bay enclosed by Eye Peninsula on the east coast of Lewis. Other advantages of coastal locations are that better drainage usually prevails, and that shell sand and sea weed are often available for fertilization. In the location of the crofting settlements it has seldom been possible to consider aspects of slope and protection from the wind. Character of the soil has been the chief locating factor, and most of the best soils occur, unfortunately, in the exposed parts of the islands.

The tilled land of the croft settlements, except where boulders and outcrops interfere, is generally laid out in a series of parallel strips at right angles to a road. The roads run usually parallel, but occasionally at right angles, to the shore, loch, or river. In western Lewis all of the townships follow this pattern with the exception of those in Carloway which is located on more hilly terrain. The modern tendency is to align the houses along and near the roads. In the older settlements and where the topography is more rugged, many of the houses are scattered up and down the slope, not necessarily facing the roads which serve them.

The normal form of the individual croft, then, is a long rectangle lying at right angles to the road. Some crofts may be as much as a mile in length and only a few yards wide. When the good soil extends only a short distance inland from the sea, the fields may be only several hundred feet in depth. On the poorest soil, particularly in the hilly sections of Lewis and Harris, tiny cultivated beds may be scattered about the hillside haphazardly and may total less than a hundred square feet per croft. Drainage ditches are often used as boundary lines and in some cases are cut entirely around the croft. At Barvas, Lewis, the "Machar" is limited in extent and is divided among the crofters separately so that the croft is made up of two disconnected parts.

In many townships in the Outer Hebrides, the old "run-rig" system is still in use.¹⁰ Under this system, the land suitable for cultivation is kept in common ownership and is periodically reallocated by means of a double ballot, the first ballot being drawn to see in what order drawing will be for the ballot that determines which piece of land or "rig" an individual will receive. In north Uist the "machar" land is divided into large fields called "scatts," which are in turn divided into as many "rigs" as there are inhabitants in the community. The "scatts" are cultivated in a two or three year rotation, and one or two out of a dozen may be planted to crops at any one time. "Machar" land is seldom cultivated for more than three successive years be-

¹⁰ Alexander Carmichael, "Grazing and Agrestic Customs of the Outer Hebrides," *The Celtic Review*, X, Dec., 1914: 48.

cause of the danger that dunes will be formed, making it difficult to establish grass again.

The crofters' cattle and sheep feed on the grass about the cottages or on the rough pasture, except on the "machar" lands where a relatively dense cattle population is maintained. The uninhabited islands are also used for grazing, sheep occupying many of them the year round, and cattle being taken to some of the larger and more accessible ones during the summer months.

Even disregarding the exaggeration caused by unrecorded subdivision of holdings, inclusion of drainage ditches in "tilled acreage," and the practice of recording parts of acres as full acres, the registered size of individual holdings is remarkable evidence of the crowding upon the land. In all the islands 49.3 percent of the holdings are from only one to five acres in extent, 37.6 percent have five to fifteen acres, 9.6 percent have fifteen to thirty acres, 2.6 percent have thirty to fifty acres and only 0.9 percent of the holdings exceed fifty acres in size.¹¹ Almost all of the machar is divided in small holdings, which means that the larger holdings consist in considerable part of poorer land. In Lewis, two-thirds of the holdings are under five acres in size and 98 percent are under fifteen acres.

By comparison with the mainland crofting counties, the density of population on the islands gives additional testimony to the pressure on the land. The density of population from all the islands is thirty-four per square mile; for the individual islands it varies from sixty-one in Barra and forty in Lewis to twenty-seven in the Uists and twenty-three in Harris.¹² These figures compare with densities of nineteen and twenty per square mile in the Highland counties of Ross and Cromarty and Inverness, to which the Outer Hebrides belong.

CROFT HOUSING

Within the crofting settlements the actual sites for the houses have been selected, when possible, with a view to preserving the best land for cultivation or pasture.¹³ Little regard for drainage or other convenience is evident; the houses are often surrounded with puddles or even marshes. The matter of a proper water supply is also often ignored. Most of the water is obtained from surface wells situated near cultivated land which has been manured with human as well as cattle excreta, and these wells may be situated as much as a mile from some of the houses. The people carry their own jugs and pails and dip them into the wells. Rain water pools are frequently used in place of the wells.¹⁴

Just as the crofting and fishing activities of the Hebrideans are closely limited by the elements, so the houses, and particularly the "black houses," are a product of the physical geography of the islands. Despite the evident drawbacks, especially with

¹¹ Department of Agriculture for Scotland, *Parish Summaries*, 1939.

¹² *Census of Scotland*, 1931.

¹³ Alexander Stevens, *op. cit.*, p. 82.

¹⁴ W. Leslie Mackenzie, "Special Studies in the Outer Hebrides," *Scottish Mother and Child*, Chapter 37, p. 442.

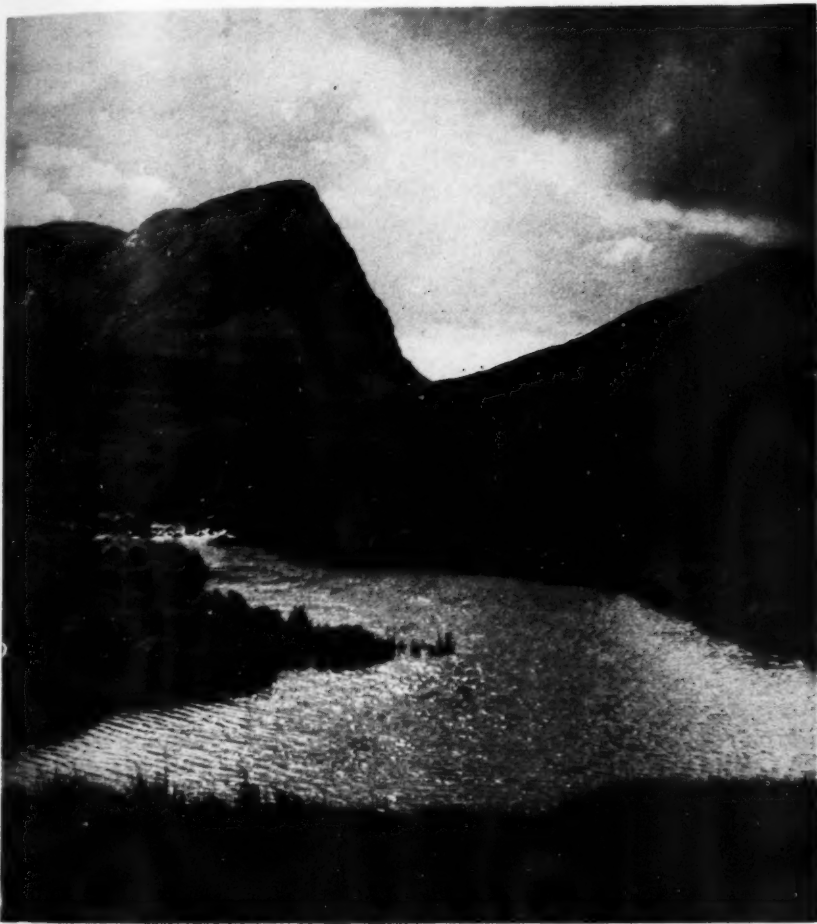


FIG. 2. Strone Scourst (Mountain), Isle of Harris. Harris contains the most rugged terrain in the Outer Hebrides. The wet, peaty soil is suitable only for rough grazing.

regard to sanitation, these houses show in every minute detail a careful adaptation to the physical conditions of the Hebrides. The more modern homes, the "white houses" and other dwellings, despite their greater cleanliness, are not nearly so well adapted to the wild, wet, winter weather they must withstand.

These "black houses"¹⁵ are built of undressed stone gathered from every available source. The rock of the islands is hard to work and much of it is covered by a deep layer of peat. Often two or three years are spent by a young man in collecting

¹⁵ Aage Roussell, *Norse Building Customs in the Scottish Isles*, Copenhagen, Levin and Munksgaard, 1934.

stones to build a house. Sometimes a large stone is split by building a peat fire over it.

Because of the absence of materials for mortar, the walls are erected dry. They are built double, the space between being filled in with turf, small stones, or sand, if it is available. The filling, in addition to weatherproofing the walls, provides excellent insulation. The whole wall, about six feet high, may be as much as five feet thick at the base, and may taper to a thickness of about three and a half feet at the top to give greater strength to the structure. In the older "black houses" the corners are often rounded; the more recent houses of this type have squared corners and there is evident a greater care in the selection and fitting of stones.¹⁶

"Black houses" usually have a simple rectangular plan and measure from thirty to sixty feet in length by about eighteen to twenty feet in width.

Since wood of any sort is difficult to get, the problem of beams for the roofs has been a difficult one. Washed-up logs and lumber and other bits of driftwood are carefully collected, and, if suitable, are used for roof construction. Among the many old Hebridean songs is one incantation which asks that, if shipwrecks be necessary, they occur on or near the shores of the islands so that the people may be supplied with abundant wood for building purposes.¹⁷

One or two layers of turf are usually placed on top of the walls to make them at least partially watertight and to make an even surface for the ends of the rafters. Because the roof must withstand the great winds and driving rains, the rafters are rested on the inner facing of the double wall so that no gables may provide a purchase for the wind. Large sods are placed over the rafters and a thatch of barley straws is in turn placed over the sods. The thatch is held in place by heather ropes from which heavy stones are suspended around the building.¹⁸

The interior of the old "black houses" was normally divided into three rooms: the byre, to which the door gave direct access, the living room in the middle, and the bedroom. In the older houses the partition separating the byre from the living room was only a partial one, consisting of perhaps a row of box beds. Today, in most of the houses this partition extends to the roof or the byre is a separate building entirely.

The floor of the byre is normally eighteen to twenty-four inches below the surface of the remainder of the house. It was formerly the custom to permit the manure from the cattle to accumulate here throughout the winter, since placing it outside would expose it to exhaustion through leaching. This practice is still followed in some areas.

In the middle of the living room, a peat fire is kept burning continuously. Until fairly recent years the smoke from the fire was permitted to seep out through the roof

¹⁶ E. Cecil Curwen, "The Hebrides, a Cultural Backwater," *Antiquity*, XII, September 1938: 264.

¹⁷ Alasdair A. MacGregor, *Behold the Hebrides*, W. & R. Chambers, Ltd., Edinburgh, 1935, p. 198.

¹⁸ R. W. Buchanan, *The Hebrid Isles*, Chatto and Windus, Edinburgh, 1883, p. 198.



FIG. 3. Black Houses, Callernish, Isle of Lewis. Note the dry stone construction and the fish net used to secure the thatch on the far building. These two houses are true examples of the old "Black House" and are preserved as antiquities by the National Trust.

or blow out the door. More often a small hole was left in the roof or a herring barrel was inserted in the thatch to serve as a chimney. Under such conditions the turf-covered rafters and thatch soon became black (hence the name "black houses"), and saturated with smoke and gases given off by the fire. Because the thatch becomes impregnated with these gases, it is considered a valuable addition to the supply of fertilizer.

The floor of the living room is the bare ground sometimes sprinkled with fine sand. Most of what little light there is in the living room comes from the door and from one or two tiny windows, which are almost invariably on the east or northeast side of the building for shelter against the prevailing southwesterly winds. Because of the thickness of the walls, the tunnel-like nature of the windows permits the entrance of little light. In addition to the peat fire the standard furnishings of the main room usually are a large black pot suspended from the roof, benches, a few hard chairs, a dresser and table, and possibly a spinning wheel. The bedroom is often floored with wood upon which thatch for bedding may be placed.

Such is the typical "black house" and it is difficult not to admire its builders for the utility, if not the beauty and comfort, of its features. In the words of Margaret Shaw Campbell, "such a dwelling belongs to the landscape and is revered by the

winds."¹⁹ Many of the houses have undergone alterations to "modernize" them, but each gain has brought some loss in over-all utility and adaptation. The more common changes include: the cutting of walls to provide window space or an additional door opening into the living room, the placement of hearths against newly built stone partitions, the erection of stone chimneys, the replacement of heather rope stays by manila rope or occasionally by chicken wire, and, more drastic, the replacement of the turf and thatch roof with a metal one.

Although one can well appreciate the manner in which the "black house" fits the landscape in which it is found, it is impossible to ignore its unsanitary conditions. Of 314 houses inspected in seven townships on Lewis in 1905, all except forty-two were declared grossly unsanitary and unfit for habitation.²⁰ Considerable progress was made in the lower islands in the next few years in providing for housing of the cattle in buildings separated from the house. In Lewis, however, because of the crofters' failure to cooperate, the local Board of Health was unsuccessful in this, and failed even to enforce the erection of a substantial wall between the byre and the living room.

The Poor Law Commission wrote in 1909 concerning the parish of Barvas on Lewis,

"The number of inhabited houses is over 1300 grouped in some 26 separate townships; and over 100 of these houses are glaringly and shockingly defective from a sanitary point of view as regards their construction, drainage, and surroundings. Human beings, cattle, and other livestock are all housed under the same roof without any effective partition-wall; all enter by the same door as a rule, breathe the same air night and day, while the excretal matters of man and beast, and refuse and slops, are allowed to accumulate in the byre end of the house from spring to spring. Drainage is almost entirely neglected about the houses, and liquid sewage is permitted to find its way where it may. The water-supply is often defective, and frequently contaminated with sewage."²¹

Again, in 1919, although it was reported that twelve hundred houses in Lewis had been improved in the previous twenty-five years, five thousand houses were still considered unfit for human occupation.²² And in 1936, Geddes estimated that "white houses" represented only ten percent of the total dwellings in Lewis.²³ The Lewis Association estimated in 1944 that "well over 4,000 new houses are required for rural Lewis."²⁴ Finally, the Agricultural Survey of Scotland estimated from a representative sample that eighty-seven percent of all farms in Lewis and Harris lacked adequate buildings and other owners' equipment in 1946,²⁵ while none of the crofts sampled in the other islands of the Outer Hebrides was found to have adequate

¹⁹ Margaret Shaw Campbell, "Hunting Folk Songs in the Hebrides," *National Geographic Magazine*, XLI, February 1947: 251.

²⁰ *Report on the Sanitary Condition of the Lews, Cd. 2616 of 1905*, p. 8.

²¹ *Report of the Poor Law Commission, 1909*, p. 154.

²² H. F. Campbell, *Highland Reconstruction*, Alex. MacLaren and Sons, Glasgow, 1920, p. 184.

²³ Arthur Geddes: "Lewis," *The Scottish Geographical Magazine*, LII, 1936: 311.

²⁴ *Lewis Association Report, Part I, Inverness*, The Highland News Ltd., 1945, p. 34.

²⁵ *Agricultural Survey of Scotland*, Table 46, p. 71.



FIG. 4. Hamlet near Balallan, Isle of Lewis. Many old Black Houses are now used for byres, while the living quarters are erected nearby, though modified Black Houses are inhabited in many parts of the Islands.

buildings by the standards set. By comparison, the study estimated that forty-seven percent of the farms of the Highland Counties and thirty-seven percent of the farms in all of Scotland lacked adequate buildings.

Today, there is very considerable activity in the way of house-building on the islands and another decade or two may well see the last of the pure "black house" type, though partially improved ones will doubtless still be abundant. In the southerly islands "black houses" probably represent about one-quarter of the total dwellings and the byre now stands, as a rule, entirely detached from the house. In Lewis, however, "black houses" are in many areas still more numerous than white houses and the byre is still often joined end to end with the house, though with an independent roof.²⁶

Many, if not most, of the "white houses" have been built with the aid of a governmental grant of £250 each, half of which was repayable by annual rent of £6 10s for twenty years. From 1920 to 1940 nearly twelve hundred loans were made in Lewis and Harris for the erection and improvement of houses. But twelve hundred

²⁶ Werner Kissling, "The Character and Purpose of the Hebridean Black House," *Journal of the Royal Anthropological Institute*, LXXIII, 1943, p. 91.

improved houses are far from a sufficient number of decent dwellings for a population of 25,000. Many more are needed.

The standard white houses were designed to provide adequate air space. They are provided with windows that open at top and bottom, and are floored with cement. They are built with stone and lime with slate roofs in the first houses and roofs of asbestos or tin in the later ones. Although the first white houses were poorly planned, the later ones proved to be a distinct improvement over their predecessors. Even now, however, the "black houses" are more agreeable in winter than are the "white houses" because of their better ventilation and greater warmth. In addition, the constant cannonading noise caused by the metal roof whipping up and down in the wintry blasts is most disagreeable, while there is far poorer insulation than that provided by the sod and thatch roofs of the "black houses."

Some of the houses today are being built of poured concrete because of the difficulty of obtaining local stone. Concrete, however, has the disadvantage of being very damp and disagreeable on the inside. Large windows are also being used, windows which are doubtless desirable from the standpoint of light, but which provide poor insulation against winter cold and winds. Double windows would probably be a desirable addition to these newer houses. Werner Kissling, who has made several detailed studies of Hebridean houses,²⁷ considers the newer buildings "ill adapted and even hostile to the people's manner of life."²⁸ He recommends an adaptation of the old "black house," with thick walls constructed of local stone and with a return to the thatched roof, which he considers best from the standpoint of economy, appearance, and warmth. Kissling's proposed house would have two stories, with a kitchen and living room occupying the lower floor and two bedrooms taking up the upper floor. A separate small hut would contain bath, toilet, and workshop.²⁹

Unfortunately, much of the construction that is going forward in the Outer Hebrides at a relatively rapid rate today does not seem to be planned with either great care regarding the building itself and its relation to the environment or to its general location. As far as the building is concerned, something akin to what Kissling has recommended would seem to provide the desirable happy medium between complete adaptation and the necessity for greater comfort and better sanitation. With regard to location, the practice of erecting the new home right next to the old often means that many of the old disadvantages are retained. Optimum conditions—and the difficulties of obtaining them must be admitted—would include a good exposure to the sun, shelter from the winds, fairly ready access to peat, a good water supply, and sloping land to permit proper drainage. Considerably greater weight can be given to these factors and to their careful balancing than has been done to date.

One of the most baffling obstacles connected with the housing problem is that

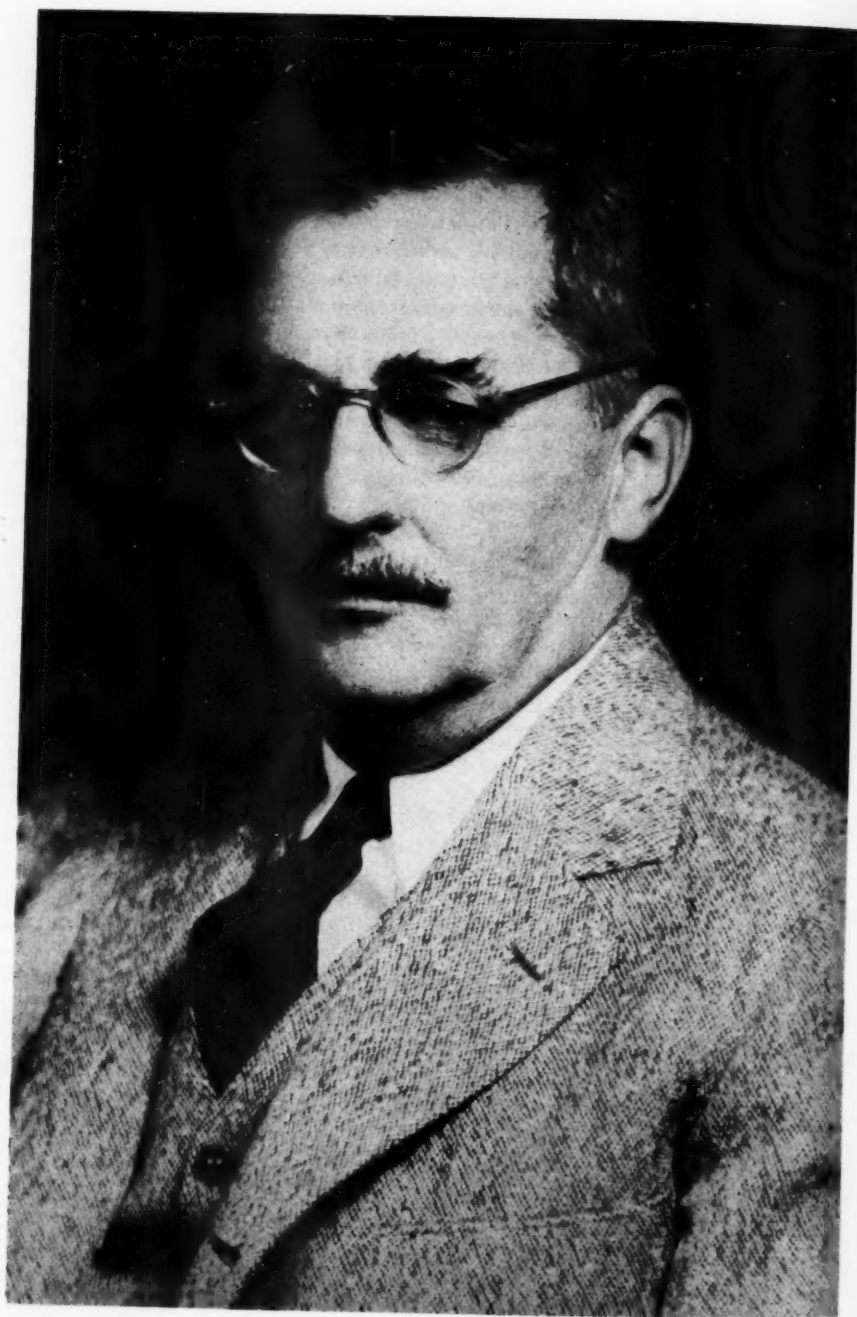
²⁷ Werner Kissling, *op. cit.*, pp. 75-100. Werner Kissling: "House Traditions in the Outer Hebrides," *Man*, 1944: 134-40.

²⁸ Werner Kissling: "Character and Purpose of the Hebridean Black House," p. 93.

²⁹ Ministry of Public Works for Scotland, *Farm Buildings for Scotland*, 1946.

provided by the squatters, inhabitants who own no land and who have erected dwellings on the common grazing land. These people, of whom there are over twelve hundred on Lewis alone, make a perplexing problem for the public health officials. With little means to pay taxes except when employed, owning no land to be taxed, they create congestion and often possess the poorest of the houses in the community. In the fishing communities, the evils of overcrowding are also often intensified. Even in the better villages the sanitary arrangements are primitive and the water supply often defective. The general poverty of the fishing industry before the war contributed to the deterioration in the housing conditions. A large development of new houses at Stornoway, has considerably improved conditions in that burgh, by far the largest community on the islands.

There can be little doubt, in conclusion, of the need and the room for improvement in croft housing. In effecting betterment the best of the old should be combined with the knowledge of new techniques and materials. In particular, close attention should be paid to the achievement of the past in the close adapting of living arrangements to the physical conditions.



KIRK BRYAN

Photograph by Sargent Studio

KIRK BRYAN, 1888-1950

DERWENT WHITTLESEY

Harvard University

PROFESSOR Bryan sometimes said that, if forced to choose between geology and geography, he would reluctantly set himself down as a geologist. Fortunately, working in a Department of Geology and Geography at Harvard University, in the tradition of N. S. Shaler and W. M. Davis, he never had to make that hard choice. Instead, from the vantage of physical geography, he contributed creatively to a wide range of subjects—geology, engineering, hydrography, soil science, climatology, plant ecology, anthropology, and human geography. To each he brought the rich fruits of his study of the earth as an association of surface features having diverse origins and varied issues.

He made his career largely in New England, obtaining his doctorate at Yale, teaching there for three years, and being a member of the Harvard faculty from 1925 until his untimely death in 1950. His observations of New England, based on numerous excursions into the field, were penetrating and stimulated study and publication by colleagues and students. He himself published relatively little on specific New England subjects, mainly discussions of glacial problems. Closer to the interests of many geographers is

"Geological Features in New England Ground Water Supply," *Journal of the New England Water Works Association*, L (1936), 222-8.¹

As a boy and young man, Bryan had lived mainly in dry western North America, and he became known through studies of that region. Born in New Mexico in 1888, he was introduced to earth science by Professor W. G. Tight at the university of his home state. In 1912 he was appointed to the U. S. Geological Survey, and an early assignment was a field study in California. Between his return from army service in France at the end of World War I and his settling at Harvard, he worked full time on the Survey, partly in Washington, but chiefly in western United States. Until the day of his death he continued to devote summers and other leaves to field expeditions, usually in arid United States or Mexico.

His publications, beginning with his doctoral dissertation, report continuous observation of the unglaciated country where, as W. M. Davis has pointed out, American geographers first became aware of the normal pattern of stream erosion. His country was landscape fashioned by wind as well as water, where scant rainfall, unreliably distributed, affected the landforms in distinctive ways. For three summers he conducted a field course, and then and later generously adjusted his own schedule in order to counsel his advanced students and young colleagues on their

¹ Citations of published work in these pages are confined to the more important contributions geographic in character. A complete bibliography is being published by the Geological Society of America in connection with a memoir by Esper S. Larsen, Jr.

field problems, many being projects suggested by himself. He was author of nearly half a hundred papers on arid lands, and joint author of a number of others, where his name was likely to follow that of his junior collaborator. The intimate, firsthand knowledge of dry North America that these studies disclose was the fountainhead from which flowed ideas that fructified and enriched not only geomorphology, but neighboring fields as well. He freely shared his perennial outpouring, outlining to me and doubtless to others, one promising project after another, and urging that it be undertaken. His enthusiasm was contagious, and it is not surprising that he ranked near the top among American geographers in the number of Ph.D. degrees earned under his guidance.

His studies contributed most immediately to geomorphology, in which he was a constant innovator, moving far beyond the bounds set by his predecessors. Through these successive enlargements of subject matter and viewpoint, he kept constantly in mind the regional aspect of the topics he investigated. The title of his novel and highly valued course, "Geomorphology of Arid Regions," accurately states its nature as regional physical geography; his "Physiography of North America" was no less so, even though the title does not disclose its regional character. Many of his papers likewise reveal the central place in his thinking occupied by distributions of earth features.

As a humane student of arid regions, he was acutely conscious of the paramount importance of water to the inhabitants of those regions. His second publication can be claimed as human geography without forcing the definition, and many of its successors, some of which are here listed, either record the use of water by denizens of arid regions or state the conditions prerequisite to its use, including engineering problems of dam sites.

"Ground Water for Irrigation in the Sacramento Valley, California," *U. S. Geological Survey Water Supply Paper 375*, 1915 (1916), 1-49.

"Routes to Desert Watering Places in the Papago Country, Arizona," *U. S. Geological Survey Water Supply Paper 490-D*, 1922, 317-429.

"The Papago Country, Arizona—A Geographic, Geologic, and Hydrologic Reconnaissance with a Guide to Desert Watering Places," *U. S. Geological Survey Water Supply Paper 499*, 1925, xviii and 436 pp.

"Geology of Reservoir and Dam Sites with a Report on the Oroyhee Irrigation project, Oregon," *U. S. Geological Survey Water Supply Paper 597-A*, 1929, 1-72.

"Flood-water Farming," *Geographical Review*, XIX (1929): 444-56.

Lifelong intimacy with dry country, and professional study of it, brought him into the controversy over the relative potency of man and nature in modifying the landscape. He recognized that human settlement and use of the land might contribute to alternation between erosion and silting in the valleys, to changes in level of the water table, and to destruction of natural vegetation—perhaps by acting as the "trigger" to release natural forces. At the same time he held that nature plays the dominant role in such changes or oscillations. This view was unpopular in circles

where "soil conservation" had become a shibboleth of vested interests apart from its service as a rationale of applied geography. Bryan was no man to refuse combat in support of conclusions he had drawn from his scientific studies, and on occasion he took sharp issue with those who put the whole blame for deterioration of the habitat upon unwise use of the land.

"Date of Channel Trenching (Arroyo Cutting) in the Arid Southwest," *Science*, n.s. LXXII (1925): 338-44.

"Historic Evidence on Changes in the Channel of Rio Puerco, a Tributary of the Rio Grande in New Mexico," *Journal of Geology*, XXXVI (1928): 265-82.

"Erosion in the Valleys of the Southwest," *New Mexico Quarterly* (Nov., 1940): 227-32.

"Pre-Columbian Agriculture in the Southwest as Conditioned by Periods of Alluviation," *Annals of the Association of American Geographers*, XXXI (1941): 219-42.

His views were based on land-use in pre-Columbian times as well as since the advent of Europeans. Interest in early man as part of the geomorphic process brought him into close association with the Department of Anthropology at Harvard, where, for two-score years, physical geography has been an integral part of training for the doctorate. It also led him to investigate the sites where artifacts and skeletons were being unearthed. At intervals from 1923 onward he participated in expeditions to the Southwest sponsored by the National Geographic Society, the Peabody Museum of Harvard, and the Smithsonian Institution, demonstrating the value of cooperation between geographers and anthropologists in investigating remains of early man. In 1948 he extended these field studies to Western Europe. In making himself an authority on human beginnings, he became one of the few Americans who combined geography and anthropology. In doing so he prepared the ground for a human geography of a period for which the only evidence is archeological and geomorphic.

"Recent Deposits of Chaco Canyon, New Mexico, in Relation to the Life of Prehistoric Peoples of Pueblo Bonito" (abstr.) *Journal of the Washington Academy of Science*, XVI (Feb. 4, 1926): 75-6.

"Geology of the Folsom Deposits in New Mexico and Colorado," in *Early Man*, G. C. MacCurdy, ed. (1937), pp. 139-52.

"Prehistoric Quarries and Implements of Pre-Amerindian Aspect in New Mexico," *Science*, n.s. LXXXVII (1938): 343-6.

"Stone Cultures Near Cerro Pedernal and Their Geological Antiquity," *Bulletin of Texas Archeological and Paleontological Society*, XI (1939): 9-42.

"Geological Antiquity of the Lindenmeier Site in Colorado," with L. L. Ray, *Smithsonian Misc. Coll.* 99 (1940), 1-76.

"Correlation of the Deposits of Sandia Cave, New Mexico, with the Glacial Chronology," Appendix in *Smithsonian Misc. Coll.* 99, #23, (1941): 45-64.

"Geologic Antiquity of Man in America," *Science*, n.s. XCIII (1941): 505-14.

"Flint Quarries—The Sources of Tools and . . . the Factories of the American Indian," *Peabody Museum of American Archeology and Ethnology, Harvard Univ. Papers* XVII (1950), #3.

From studies of windwork, supplemented by research on pre-Columbian land-use and early man, it was a natural although an original step to periglacial conditions. This interest absorbed an increasing portion of his teaching and research, and led to paleobotany, to soils, to Pleistocene climate, and to permafrost. His researches found outlet in another of his novel courses, "Geography of the Pleistocene," and in publications.

"Change in Plant Associations by Change in Ground Water Level," *Ecology*, IX (1928): 474-78.

"Paleoclimatology in North America as a Result of the Study of Peat Bogs," *Zeitschrift für Geomorphologie*, Band 8, Heft 3 (1934), 144-6.

"Cryopedology—the Study of Frozen Ground and Intensive Frost-action, with Suggestions on Nomenclature," *American Journal of Science*, #244 (1946): 622-42.

Having interests so far-reaching, Byran inevitably pondered the place of geomorphology in the scientific world. Over many years he subjected rival theories of land formation (such as those of W. M. Davis and Walther Penck) to the criticism of field application. Introducing field observations to his course "Principles of Geomorphology," he used laboratory practice to test hypothesis. In several papers he addressed himself to the nature of geomorphology, and also touched upon it when evaluating the work of his predecessors and co-workers.

"Persistence of Features in an Arid Landscape—The Navajo Twins, Utah," with E. C. LaRue, *Geographical Review*, XVII (1927): 251-7.

"Albert Perry Brigham—the Physiographer, in Appreciation of the Contributions to Earth Science of A. P. Brigham," *Annals of the Association of American Geographers*, XX (1930): 71-2.

"The Retreat of Slopes, in Symposium on Walther Penck's Contribution to Geomorphology," *Annals of the Association of American Geographers*, XXX (1940): 254-68.

"Physiography, in Geology, 1888-1938," *50th Anniversary Volume of the Geological Society of America*, 1941: 1-15.

"Physical Geography in the Training of the Geographer," *Annals of the Association of American Geographers*, XXXIV (1944): 183-9.

"The Place of Geomorphology in the Geographic Sciences," in "Symposium on Geomorphology in Honor of the 100th Anniversary of . . . William Morris Davis (arranged by Kirk Bryan)," *Annals of the Association of American Geographers*, XL (1950): 196-208.

"Research in Geomorphology," *National Research Council, Division of Geology and Geography Annual Report for 1949-50*, 1950: 64-7.

In the last of the papers here cited, he set down his mature judgement:

"Geomorphology is the study of landforms now in the making, and thus is a branch of Natural History within the domain of Dynamical Geology or of Physical Geography. Nowadays, when these studies are quantitative, they are classed as Geophysics, related to the everbroadening field of Hydrology."

"But most landforms are in whole, or in part, relicts of an earlier time, and hence geomorphology is a branch of Historical Geology. . . . Viewed from the standpoint of its interrelationships geomorphology is never pure, and can be considered a working method in the field of general geology."

"As a working method it is applicable, and frequently the only satisfactory approach to problems in (1) Tectonics, amount and time uplift; (2) Interpretations of stratigraphic relationship, especially unconformities; (3) Economic geology; placers, residual ores, ground water, etc.; (4) Glacial geology; (5) Paleogeography of the Pleistocene."

". . . note that geomorphology rests its case on two fundamental necessities: (1) a more precise knowledge of current process in the many existing climates; (2) a more precise knowledge of paleogeography, and particularly paleoclimatology. These necessities may not be 'fundamental' to geology, but they underlie any advance in geomorphology as a tool and 'working method.'" (Quotation from pp. 64 and 65.)

On the larger field of geography as a whole he appears to have left no written pronouncement. In talking informally or to classes, he frankly championed environmental determinism, flying gleefully in the face of the trend away from that doctrine. Within the limits of his concentration on arid and glacial lands, his position is readily understood. As an expert in areas of harsh environment, inhabited by retarded peoples or by advanced social groups narrowly restricted by drouth or cold, he was working with a world where nature gives humanity little choice of action. In such regions the distinction between determinism and possibilism is shadowy, and perhaps academic.

Contributions to geography through the wide range of his technical papers were matched by activities of a more personal nature. He participated in half a dozen symposia concerned with particular aspects of physical geography or with the work of outstanding geographers. The last of these was the half-day session he organized at the 1950 meeting of the Association of American Geographers in recognition of W. M. Davis's centennial year. In actively supporting the Association, he followed the example set by the earlier generation of physical geographers. Among other services, he was a member of the Council for a full term.

At Harvard he unfailingly supported geography in its entire range from meteorology at Blue Hill to human geography at the Business School and in the College and Graduate School of Arts and Sciences. He hospitably opened his classes to graduate students and undergraduate concentrators in human geography, and in 1946 created a course especially for them entitled "Landscape—A Geographic Analysis."

A large collection of reprints is evidence of his close personal touch, through correspondence, with European and Latin American scholars in the several fields

of his interest, as well as with the English-speaking segment of his profession. These reprints he used in his "Seminar in Geomorphology" for graduate students. Meeting one evening a week in the comfortable and stimulating surroundings of his home, successive groups combed the current publications and left as a by-product a considerable number of translations into English and summaries of American publications in foreign periodicals.

Geography is impoverished by the loss of one of its zestful personalities who, though trained as a geologist, understood the respective functions of the two disciplines and accomplished distinguished work in both.

REVIEWS AND ABSTRACTS OF STUDIES

WORLD GEOGRAPHY OF PETROLEUM

Pratt, Wallace E. & Good, Dorothy, editors, *World Geography of Petroleum*. xvii and 464 pp; index; maps and photographs; American Geographical Society, Special Publication no. 31, Princeton University Press, Princeton, New Jersey, 1950. \$7.50. 7×10 inches.

The American Geographical Society's 31st special publication is an important contribution to the literature on petroleum. The various chapters of this attractively printed and well illustrated volume have been written by 20 prominent geologists, economists, and administrators.

The need for a comprehensive world survey of the distribution, occurrence, production, transportation, and reserves of petroleum, including the influence of the petroleum industry on the economic, social, and political life of nations, is given as the reason the American Geographical Society undertook the publication of this book. The noteworthy success that has been attained in this volume in dealing with the large, complex petroleum industry, is attributable to the choice of contributors with first hand knowledge of and experience in the petroleum industry.

Although *World Geography of Petroleum* is the work of specialists, it is written so that it is readily understandable by the general reader. Of the four parts into which the book is divided, the first two are an elementary survey of petroleum geology and technology written especially for readers not technically trained in those fields. Part I by Eugene Stebinger, formerly geologist, U. S. Geological Survey, and Chief Geologist, Standard Oil Company of New Jersey, deals with the principles of petroleum geology and the techniques utilized in the search for petroleum. Mr. Stebinger points out that oil and gas have been found in sedimentary rocks of all of the geological periods from the Cambrian to the Recent. Oil and gas originate from organic matter, probably mostly from plankton deposited with marine shales and limestones. After generation the oil and gas migrate into structural or stratigraphic traps where they accumulate to form pools.

Part II by W. B. Heroy a consulting Geologist with extensive experience in the petroleum industry, is a summary of the development, production, storage, transportation, refining, and distribution of petroleum. Mr. Heroy states

that the United States has 110,000 miles of oil pipelines, the longest oil pipeline system of any country in the world, and in addition has about 259,000 miles of natural gas pipe lines. He points out that even so, tank cars are at present more important than the pipe lines for the distribution of petroleum products other than gas, for over 50,000,000 tons of petroleum products are shipped annually in the United States in about 150,000 tank cars.

Part III, entitled "The World's Petroleum Regions," is the most important part of the book in the opinion of the reviewer. This part constitutes over two thirds of the book and consists of sixteen chapters that deal with the different petroleum regions of the earth. Thirteen authorities have contributed to this part and much new information is presented.

The petroleum regions have been discussed in terms of the history of the petroleum industry, production, topography, geology, climate, vegetation, oil field development, transportation, marketing, government regulations, and the impact of the industry on the social structure and politics of the countries. Two noteworthy chapters which point to future developments in petroleum exploration are Chapter 14, "Petroleum in the Polar Areas," and Chapter 15, "Petroleum on the Continental Shelves," both by Wallace E. Pratt.

The two greatest oil provinces in the world are the Middle East, and the lands and continental shelves surrounding the Caribbean Sea and the Gulf of Mexico. Ever since the first part of this century the bulk of the oil in world trade has originated in the latter province. The Middle East has only recently begun to produce a significant part of the world's oil, but development of that region is progressing rapidly. Large holdings in the Middle East by American oil companies and the necessity for the importation of petroleum by the United States since 1948 have spurred developments. The Middle East is thought to have the world's largest petroleum reserves and the Caribbean—Gulf Coast province the next largest.

Part IV deals with aspects of petroleum utilization. This part has five chapters by different authors. One of the chapters is "Availability of Petroleum" by Kirtley F. Mather; another is "Geographical Aspects of Petroleum Use in World War II" by the office of the Army-Navy Petroleum Board of the

Joint Chiefs of Staff; and a third is "World Patterns of Civilian Utilization" by John W. Frey. In the chapter on the availability of petroleum, Professor Mather states that the United States leads the countries of the world in petroleum production. Between 1859 and January 1, 1949 the world production of petroleum totaled more than 58,000,000,000 barrels, and slightly more than 37,000,000,000 barrels of this was produced in the United States. He also points out that petroleum is an unrenovable resource that ultimately will be exhausted. The United States produced more than 2,000,000,000 barrels of petroleum in 1948 and at that time the proved reserves of the country were only about 28,000,000,000 barrels. Although these figures suggest a rather short period of significant petroleum production remaining, the actual reserves of oil in the ground are very likely twice and possibly three times as great as the proved reserves. The world petroleum reserves are estimated to be sufficient for the world's needs for the next half or three-quarters of a century. Although natural petroleum supplies are expected to be seriously depleted in a few decades, ample supplies of synthetic petroleum products can

be obtained from natural gas, oil shale, and coal to take care of future petroleum needs for a long time.

Other noteworthy features of the book are 30 tables, an appendix on petroleum production and exports of world regions for 1938 and 1947, and twenty-two pages of bibliography subdivided and arranged in accordance with the contents of the book.

The illustrations consist of 50 specially prepared maps, 11 diagrams, and 98 photographs. The maps are primarily geographical and are very helpful to the reader. The photographs are well reproduced and illustrate various aspects of the petroleum industry the world over. Photograph 59 of the Kuh-i-Namak salt plug east of Bushire, Persia, should be of particular interest to geographers and geologists. It shows salt that has been extruded through limestone and has flowed down the mountain side.

The American Geographical Society, the editors, the authors, and the publishers are to be congratulated on the general excellence of this volume.

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